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The IRON AGE

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Top Thinking for Tomorrow

THERE has been criticism of business executives because some of them have been devoting thought to their postwar problems. The critics say that all attention should be centered upon the problem of the moment, which is that of winning the war.

Most of those who have thus commented are not familiar with the conduct of business insofar as it distinguishes between the functions of present doing and of forward looking. And it's an important distinction.

The nearer you get to the production line, the closer you get to the current date on the calendar. The machine operator thinks of today's work. His foreman thinks of tomorrow's program and perhaps a week ahead. The superintendent thinks in terms of the equipment, material and manpower that will be needed next month or the month after. The works engineer and the consulting engineer think in terms of the new buildings that will be completed six months from now. The chief executives think of what can, may and must happen to the company as a whole one or two years hence from the standpoint of markets, finance and employment—the higher, the forwarder.

The forward thinkers have already done their present thinking and planning. Their thoughts and plans are now being successfully translated into the greatest flow of victory ammunition that the world has ever seen. If they were now to turn back the advance pages of the calendar that they have been scanning and revert to the present only, all America would be out of luck in the years to come.

Thinking from one to two years in advance, the thoughts at the top must necessarily be applied to the postwar era. For we know that the war, or at least the principal part of it will be over well within that time. And somebody has to think about jobs for tomorrow. About the new products that will take the place of present war products. About new plant arrangements and facilities to make these products. About where the money is coming from to maintain a state of employment that will make jobs for the boys coming back and for as many as possible of the newcomers in industry who are now filling their places.

Industry today has reached a position in accomplishment that is beyond criticism, thanks to the sort of top thinking and planning that was done one and two years ago. But industry cannot hope to hold a position above criticism during the critical years after the war unless our top thinkers keep on looking and planning ahead. The telescope is the instrument for exploring future aims; the microscope, in other hands, is the instrument for examining past and present accomplishment.

Both the telescope and the microscope have their uses. But if we lay the former on the shelf for the duration and look only through the latter we will become both nearsighted and shortsighted.

J. H. Van Deventer



The press stamps landing mat sections out of heavy gage Inland sheets. The much-needed scrap goes back to the steel mills.

Finished landing mat sections are cleaned, painted, bundled, and shipped to fighting fronts.



Air Fields Made to Order—from Inland Sheets

Fighter planes and bombers range deeper into enemy territory when air bases are constructed quickly behind advancing troops. Steel landing mat sections, many million square feet of which have been made from Inland sheets, help gain the strategic advantage of this important air support.

Laying these interlocking sections, on desert sand or tropic mud, 70 men can build a landing strip, 1,500 ft. long by 150 ft. wide, in the record time of 24 hours. Large bombers need a runway 5,000 ft. long by 150 ft. wide, requiring 750,000 sq. ft.

of landing mat sections. The remarkable speed with which air bases are built with steel mats assures our fighting men maximum air protection in the shortest possible time.

Production of landing mat sections is only one of the many war-time uses for Inland's entire sheet output. Among others are: blitz cans, shell cases, bombs, bomb racks, pontoons, ammunition boxes, and parts for airplanes, trucks, jeeps, etc. While producing at maximum capacity for Victory, we are also preparing to supply steel for the needs of America at peace.



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● Under the virtual blanket draft deferment for farm workers, which some high manpower officials consider an indefensible waste of men, aimed chiefly to preserve cheap labor, in the past 12 months 1,500,000 farm workers out of a total force of 12,500,000 have been deferred, while only 1,400,000 industrial workers, out of 42,000,000 have received occupational classifications.

● Adhesives for joining metal have previously been described herein. A new one is Reanite, produced by U.S. Stoneware Co., Akron. A 30,000-lb. pull is required to separate two 6-in. square pieces of steel bonded with Reanite. Rubber, plastics, leather, wood, etc., joined with Reanite, give way before the bond. Two other very good products for this same purpose are being sold by B. B. Chemical Co., Cambridge, Mass., and United States Plywood Co., New Rochelle, N. Y.

● Since war began, the Army alone has received from industry one piece of artillery for every 56 U.S. soldiers, more than 1,000,000 machine guns, 5,000,000 rifles and sub-machine guns, and enough ammunition to devote 1500 rounds exclusively to each Axis soldier.

● The next 90 days of war will probably blast away more U.S. steel and scrap than has been expended from Pearl Harbor to the present.

● Two innovations in shift hours have popped up in West Coast plants. North American Aviation has instituted two 10-hr. shifts, a 60-hr. week for men and 50-hr. for women. Marinship, tanker builder, pays an extra 10 min. overtime a day for each worker to stay at the job site, transfer his tools to his relief, and tell him what goes on.

● Ships have scraped off all paint to reduce fire hazard during war time. No alternative coating has been used until recently, when the Navy and Maritime Commission started covering bulkheads, doors, crew quarters, etc., with Seaporcel, a fire-proof ceramic (glazed) coating that does not char, chip or crack, and can be cut or tack-welded like uncoated metal. The Navy is also testing Seaporcel for a hull coating.

● Aircraft armament is a subject about which there are a multitude of opinions. The U. S. sprung .50 calibre machine guns on the enemy with extremely effective results, but the British have always shown a preference for multiple .30 calibre machine guns, and cannons. The weight of ammunition that can be carried and the job to be done roughly dictates which armament is superior.

● Many first class aces prefer eight or twelve .303 high speed machine guns rather than any cannon or heavy m.g. The hosing effect is terrific (compensating sights, etc., not needed), and an opponent's plane is literally sawed apart.

● For night fighting .303s also has certain advantages, as an opponent has to come close. Furthermore, the flash of 303s can be masked, whereas the flash from a .5 m.g. or 20 mm. cannon blinds the man behind the gun.

● There is nothing like a 20 mm. shell for setting things afire, and cannon of this type is excellent for attacking bombers, small coastal vessels, railway engines, etc.

● And: The .5 m.g. is an excellent gun for defense of big formations of heavy bombers, where many guns can be brought to bear on an attacking plane.

● Indicative of what may be coming in armament is that the British and others have experimented considerably with multiple cannon in power-operated turrets for bombers, and considerable success has attended the use of a 75 mm. cannon in light bombers for use against naval craft and ground objectives. The Kick-back is something to rack even the best fuselage.

● As for aircraft gun sights, the Sperry computing sight is used by Americans and various reflector sights used by the British. But many an ace is like the famous Australian who said, "Sights? Sights?, I never use them. I just fly up on their tails press the buttons, and fly through the bits."

● WPB recently rejected pleas for an alumina pilot plant to use bauxite deposits in southwest Washington, a disappointment cancelled for the hopeful Northwest by the fact that Alcoa is now negotiating for purchase of Pope & Talbott Lumber Co., steamship line operator and, incidentally, owner of the bauxite deposit.

● Unmistakable hints point to a substitution of repair work for new construction in many West Coast shipyards.

Grinding Milling Cutters

By J. E. ROGERS

Abrasives Consultant, Toronto

TEN months ago the writer was asked by the management of Cutting Tools and Gages, Ltd. (a government-owned company), to assist its cutter reclaiming division in finding a grinding medium for a particularly hard alloy steel which was being used to build up teeth on high speed steel milling cutters by welding. After observing the action of a number of vitrified wheels of various grains and grades, which were being tested on this class of work by an engineer from a large international wheel manufacturer, the writer concluded that because of the characteristically cool, free cutting properties of resinoid bonded wheels, they alone would have a chance to succeed. This idea was suggested to the abrasive engineer, who promptly replied that the suggestion was entirely out of line with established procedure in grinding milling cutters, and consequently it would be a waste of time to even consider it.

Eventually the president of a well known Canadian grinding wheel company was approached with the same suggestion. After discussing the characteristics of the metal to be ground, he and his engineers admitted that the application of resinoid wheels was entirely unorthodox, but due to the extreme density of the weld metal there was a chance it would succeed. Subsequently an assortment of resinoid bonded wheels was made and tried. Two wheels from this assortment of grains and grades showed very definite promise. For the first time we were able to freely grind the alloy welded teeth without burning, and as the wheel passed through to the high speed steel the resulting shower of sparks completely filled the dust exhaust funnel. All those observing the trial conceded they had never seen a wheel cut so freely and produce such a fine finish.

This was the beginning of what is today a complete demonstrable success in improving the quality of milling cutter grinding, thereby greatly enhancing the productive life of cutters and at the same time lowering grinding and sharpening costs.

Cylindrical Grinding

On cylindrical grinding of welded high speed steel cutters, Fig. 1, res-

inoid wheels have been on continuous production trial on a Cincinnati machine at the cutter reclaiming plant of Cutting Tools and Gages, Ltd., for the past several months. A day-to-day check has been maintained on the comparative performance of this wheel as against the vitrified wheel in common use on cylindrical machines and applied to this class of work.

Records now very definitely indicate that resinoid wheels result in a much faster grinding time because of their ability to hold form and to cut freely and cool. In addition they do not readily load, although stock removal per traverse has been increased 50 per cent, with no indication of burning.

The average stock removal on shell end mills is from 0.050 to 0.060 in. Cutters in fairly good condition can be cleaned up with a stock removal of from 0.005 to 0.010 in. as against

0.010 to 0.020 in. with vitrified wheels and in approximately 33 per cent less time.

Another characteristic of the resinoid wheels is their ability to cut freely, yet hold good form over long periods of continuous service. It approaches the ideal in grinding wheel performance in which the bond seems to cushion the cut yet wears away as fast as the abrasive grains are dulled. Records indicate that resinoid wheels require dressing after every 60 hr. of service as against every 5 hr. with vitrified wheels. This important feature not only saves many hours of valuable production time, but offsets many times the extra cost of resinoid wheels, which on an average is one-third more than the vitrified type.

The factor of finish is also very important, especially when it can be achieved at no loss in production requirements. The resinoid wheels produce a finish that is much superior to the heavy grain serration of the vitrified wheel, although the grain size of both wheels remain the same.

Surface Grinding

On the Arter rotary surface grinder, Fig. 2, similar satisfactory results

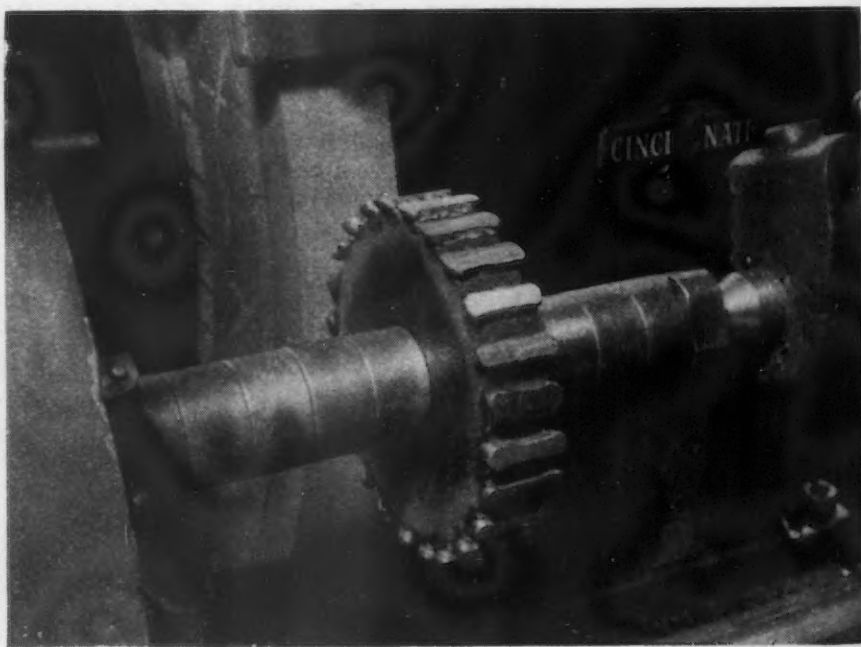


FIG. 1—Cylindrical grinding of the o.d. of a milling cutter having the teeth built up by welding.

With Resinoid Bonded Wheels

were achieved. A careful check and comparison of production results revealed the fact that resinoid wheels require 75 per cent less dressing, although stock removal was increased 100 per cent, from 0.001 to 0.002 in. per traverse, with no tendency to burn. Average stock removal on this operation is from 0.020 to 0.030 in. The following improvement over vitrified wheel performance was noted:

- 1—Approximately 60 per cent saving in time element
- 2—Superior, more uniform finish and no burns
- 3—Greatly increased wheel life.

The selection of the proper coolant for use with the resinoid wheel in cylindrical and surface grinding plays an important role in successful operation and low wheel mortality. The coolant used in the production trials cited above and found suitable for resinoid wheel application has been Stuart's Codol and Houghton's Met-cut. Other coolants of similar characteristics no doubt are available but have not been tried as yet. The best emulsion mixture was a proportion of 1:80.

While a number of experimental attempts have been made in the past to superfinish milling cutters with fine grain shellac or resinoid bonded wheels, the process entailed two or more operations and required technical experience plus most careful operating procedures. As far as the writer can ascertain, the process of material removing and super-finishing described in detail in this article represents the first successful application of resinoid bonded wheels to every phase of high speed steel cutter grinding. Not only are the cutter grinding operations speeded up, but there is also a marked improvement in cutter life between grinds.

o o o

The regashing of high speed steel milling cutters, Fig. 3, is the most important operation in salvaging or reclaiming work. Some plants anneal their cutters, then mill them to the required depth rake angle and tooth form. The reclaiming plant of Cutting Tools and Gages, Ltd., employs an all-grinding process which is done on specially developed machines and fixtures. Prior to the application of resinoid bonded grinding wheels, this operation was done entirely with vitrified wheels, which were considered quite satisfactory or at least the best type offered for this operation.

Many of the operators on these machines are inexperienced cutter grinders; consequently each man developed his individual technique of operating with corresponding varieties of finish. Many cutters had deep grain scratches on the tooth face, others were slightly burned, with the result there was a considerable number of rejections.

Uniformity of Finish

From the first trials with resinoid wheels, a uniform, fine quality of finish on the tooth face was very definitely indicated. As experiments continued toward development of a wheel of the proper grain and grade, the quality of finish and production also improved. Today we have a resinoid wheel that cuts more freely than any vitrified wheel, with at least 25 per cent less effort on the part of the operator. It cuts cool and fast without any inclination to burn and it produces a finely polished tooth face with an average depth of grain scratch less than 3 micro-in. as against 12 to 18 micro-in. from a vitrified wheel.

Because of the improved free, cool cutting factor of resinoid wheels, individual production has improved an average of 10 per cent. This improvement is particularly noticeable in the afternoon when production on manually operated machines tapers off sharply. Another important factor in the cost of this operation is the comparative mortality of resinoid and vitrified wheels. As many as 51 cutters of various types and sizes have been regashed with one resinoid wheel. The average figure in this respect has been 43 cutters as against 8 to 10 with a vitrified wheel, or 400 to 500

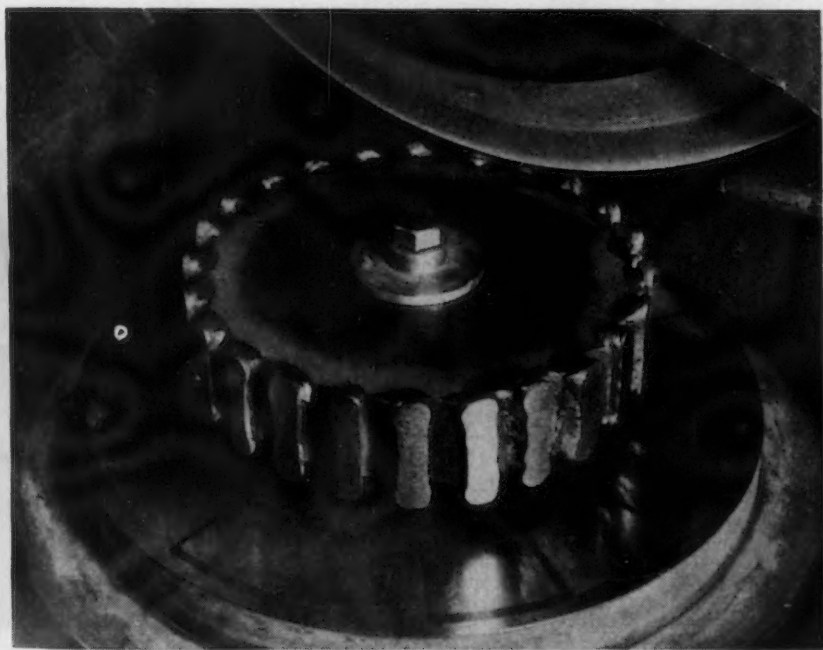


FIG. 2—Surface grinding of the same cutter as shown in Fig. 1, using an Arter rotary type machine.

per cent greater wheel life. The average material removal per traverse is 0.005 to 0.008 in.

Tooth forming or back-off grinding, Fig. 4, follows regashing the tooth to the proper depth and is done on the same machine with a formed wheel of the same width as the tooth to be ground. The vitrified wheel formerly used on this work cut very freely and it was the opinion of all concerned at the reclaiming plant that it would be difficult to duplicate its performance. However, after several trials with resinoid wheels it developed we had hit upon a wheel that would cut more freely and remove more material per traverse without burning. On repeated production trials the average number of cutters of all types ground per wheel increased 50 per cent.

Finish Grinding

With few exceptions grinding wheel manufacturers have consistently recommended vitrified cup wheels for use on tool and cutter grinding machines for finish grinding milling cutters on the lathe, Fig. 5. Grit sizes 46 to 60 were universally recommended for rough and finish grinding and not much attention was given the quality of finish, that is, the depth of scratches on the cutting edge of each tooth.

Some research work has been done by two of the large wheel manufac-

Corresponding Canadian and Carborundum Co. Wheel Specifications

Finish Grind-Flaring Cup

LION*
4/3 x 2 1/2 x 1 1/4
63/83-2-AV-4
CARBORUNDUM
4/3 x 2 1/2 x 1 1/4
6:RL-12-K12R-9A
RE-GASHING DOMINION**
10 x 3/4 x 1 1/4
361-J.K.B.

CARBORUNDUM
10 x 3/4 x 1 1/4
361RL-10-K10R-8AF
BACK OFF OR TOOTH FORMING
DOMINION**
10 x 3/4 x 1 1/2
363 I.K.B.

CARBORUNDUM
10 x 3/4 x 1 1/2
363R-12-K12R-9A and
363 RL-12-K12R-9A
TOOTH FACE-FINISHING
L'ON

10 x 1/4 x 1 1/4
80-2-AV-4

CARBORUNDUM
10 x 1/4 x 1 1/4
80RL-12-K12R-5A

GASH STAGGER TOOTH CUTTERS
CARBORUNDUM
10 x 3/4 x 1 1/4
80RL-12-K12R-5A

SURFACE GRINDING
(ARTER ROTARY MACHINE)
CARBORUNDUM
14 x 1 x 5

4:CS-12-K12R-8
SURFACE GRINDING
(ABRASIVE MACHINE-RECIPROCATING)
CARBORUNDUM
10 x 3/4 x 3

40S-12-K12R-9A
CYLINDRICAL GRINDING (TOOL ROOM)
CARBORUNDUM
12 to 20 in. diam.

60R1-10-K10R-5AF

*Product of Lion Grinding Wheels, Ltd.

**Product of Dominion Abrasive Wheels Co., Ltd.

turers on superfinishing of cutting tools with very fine grain (230 to 320) shellac or resinoid bond wheels. Since this entailed an extra painstaking operation by an experienced operator in tool grinding departments already bogged down with work, of necessity it could not be set up as general practice, even though every one appreciates the fact that the finer the cutting edge, the longer the life between grinds.

Having proved the value of resinoid wheels in the regashing and other preliminary operations, it was almost a certainty that their application to finish grinding or sharpening would prove equally satisfactory. Carefully checked records of results over the past several months have more than substantiated early expectations.

Today the reclaiming division of Cutting Tools and Gages, Ltd. is producing machine honed finished cutters in one operation, on a regular production basis, at lower cost than is possible with the conventional vitrified cup wheel. Furthermore, 40 production tests made in various top flight war production plants in Canada, with cutters finish ground with resinoid wheels, definitely prove this method of grinding will increase tool life 75 to 100 per cent.

Profilometer Readings Taken

To give a true picture of the cutting edge of a cutter conventionally ground

FIG. 3—Typical regashing operation on a worn milling cutter. From the point of view of wheel life, resinoid bonded wheels proved to be 400 per cent more efficient than vitrified wheels.

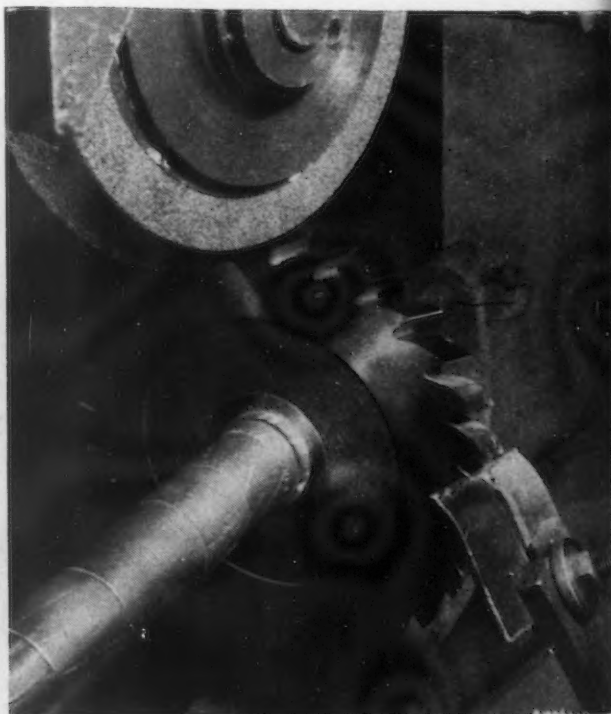
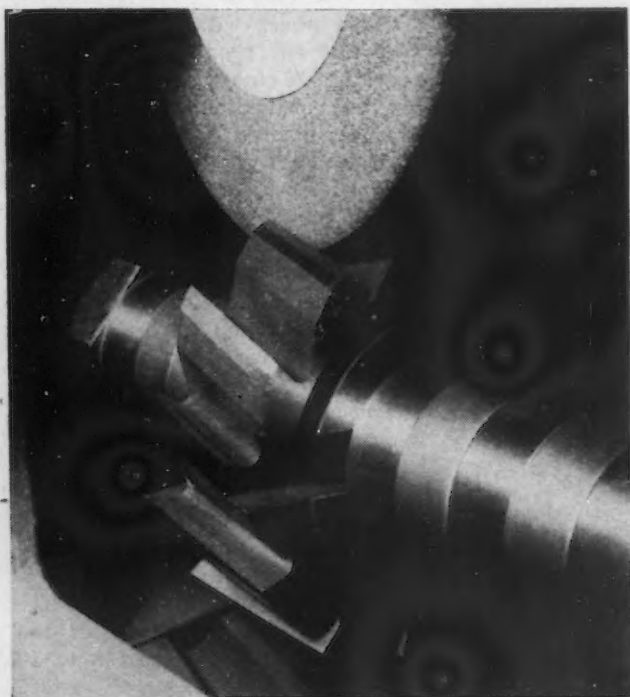


FIG. 4—Back-off grinding of the tooth with a formed type of resinoid bonded wheel. Ordinarily, this is a milling operation on the annealed cutter blank.

with a vitrified wheel the profilometer reading, Fig. 6, was taken, showing clearly the depth of scratches at the cutting edge. It will be noted that the variation from peak to peak is more than 50 micro-in. One could not expect such a cutting edge to hold up for long, and of course it doesn't. Now examine profilometer graph of a typical resinoid ground cutter, Fig. 7. Note the uniformity of the cutting edge. With the exception of teeth Nos. 1 and 7 (which indicates careless operating), the variation from peak to peak is less than 3 micro-in.

There is no extra cost attached to grinding and sharpening with resinoid wheels. As a matter of fact there is an overall saving on every grinding operation, even though the initial cost of resinoid wheels is slightly higher, and what is more important, it is possible to sharpen milling cutters that give many extra hours of productive service between sharpenings, machine to closer tolerances and save on machine maintenance and expensive replacements of high speed steel cutters.

The finish grind which is now standard practice at Cutting Tools and Gages, Ltd. reclaiming plant is as follows:

Total average stock

removal 0.020 in.

Rough cut 0.002 to 0.004 in.

• • • The presentation of the accompanying factual story of the application of resinoid bonded wheels to tool and cutter grinding is for the purpose of passing along practical information which can be quickly adapted to tool grinding requirements. Abrasive wheel suppliers will be glad to cooperate in checking the speed of machine spindles, which is an important factor in the successful application of the technique, and in making specific wheel recommendations in terms of local commercial wheel specifications. Especially in finish grinding is it necessary that the precise instructions contained in this article be followed.

Intermediate cut.. 0.001 to 0.002 in.

Finish cut 0.00025 to 0.0005 in.

Average run-out on

finish grind. 0.0003 to 0.0005 in.

The overall saving with resinoid cup wheels is 25 per cent, plus the above cited advantages.

Selection of Grinding Wheels

Selection of the proper grain and grade resinoid wheel suitable to particular tool and cutter grinding machines is most important. Machine speed is another important factor. Minimum spindle speed should be

5000 r.p.m. or 5500 s.f.p.m. Speeds below this range are not satisfactory for fine, economical finish grinding. The specification of the flaring cup wheel found most satisfactory at the above speeds is 4-3 x 2 x 1 1/4 in. (3/4 rim x 3/4 in. back) Alu-Resinoid 60-2-AV-4 or a combination grain 60/80-2AV-4. Regular No. 2 aluminum oxide grain has been found to be best suited for combining with a resinoid bond. The special or white aluminum oxide has a tendency to break down much faster than the bond, with a consequent higher wheel mortality. All wheel manufacturers in Canada are familiar with this resinoid development, as well as the Carborundum Co. and the Norton Co. in the United States.

To avoid mistakes and disappointments it is suggested that the field engineer representing an abrasive supplier be consulted. He will check the speed of the machines and recommend the grade of resinoid wheel comparable with the above specification. Consult accompanying table.

Cup wheels should be dressed with a diamond; never use abrasive stick. Recess inside wall of cup 3/4 in. To do this, offset spindle head 30 deg. To face wheel, offset spindle head 1 deg. opposite recess angle, then dress grinding face to 3/16 in. wide. Do not disturb head angle after face dressing.

The technique employed in grinding any cutter will determine the quality of finish. On the intermediate and finish cut, the work should be traversed over the stone quickly and returned slowly and steadily. This will ensure a minimum depth of grain scratch and a polished surface.

Tooth Face Grinding

Barber-Colman or Ace grinders are often used for tooth face grinding (not regashing). For this operation an Alu-Resinoid B face wheel—grain Nos. 60 or 80 2-AV-4 or equivalent grade—has been found to be quite satisfactory. When a 7 in. diameter wheel is used, the machine should be operated at 4000 r.p.m. or 7500 s.f.p.m., and when the wheel is reduced to 5 in., machine speed should

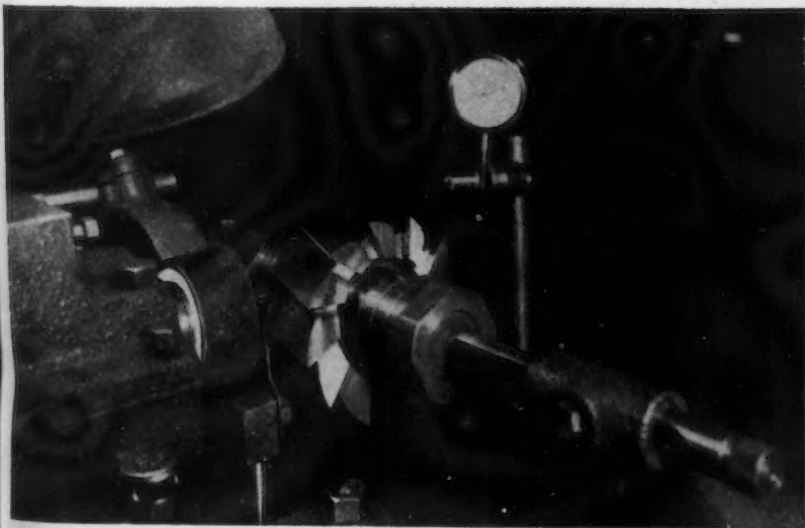


FIG. 5—Resinoid bonded cup wheel applied successfully to the all-important finish grinding of the land surfaces of the cutter.

FIG. 6—Profilometer reading taken on the cutting edges of a milling cutter ground in the conventional manner with a vitrified wheel. The peak-to-peak variance is as high as 50 micro-in. on some teeth.



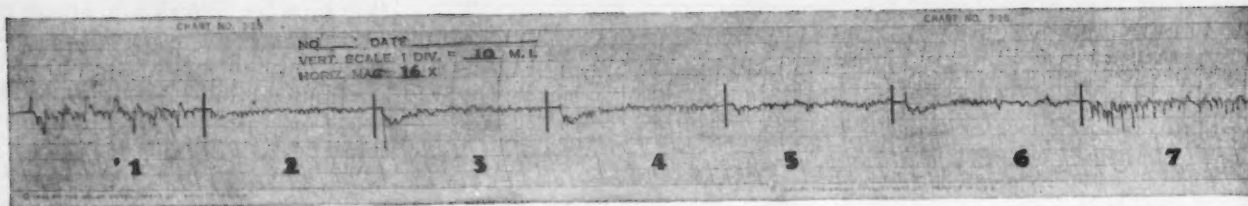


FIG. 7—Profilometer reading taken on the cutting edge of a milling cutter ground with a resinoid bonded wheel. Note the uniformity of the cutting edge except for teeth Nos. 1 and 7, which are the result of poor work on the part of the operator.

be increased to 5500 r.p.m. This is to ensure the wheel maintaining its original grade and to prolong its life.

There seems to be quite a difference of opinion as to when a milling cutter should be regashed. The writer's observation is that in too many shops much time and effort is wasted in sharpening cutters with lands $\frac{1}{4}$ to $\frac{3}{8}$ in. in. width. If a standard practice could be set up whereby a cutter with a secondary back of $\frac{1}{8}$ in., or twice the width of the land, would be set aside for regashing, the following economies would automatically accrue:

1. Better finished components
2. Higher production between sharpening
3. Reduced cost of sharpening
4. Lower cost of regashing
5. Conservation of H. S. S. cutters
6. Lower machine maintenance.

Results are the most convincing arguments to the production engineer, particularly when they embrace higher quality, increased production and lower operational costs. The in-

troduction of resinoid bonded abrasive wheels to tool and cutter grinding has not only proved revolutionary in improving the technique of grinding, but also has definitely improved production far beyond anything heretofore expected from a high speed steel milling cutter.

Reports from Industry

As a direct result of this improved grinding method, five large Canadian war production plants report production increases up to 400 per cent between sharpenings. While we have more than 40 recorded reports on file, four typical examples of the tougher operations have been selected to illustrate what has been accomplished with milling cutters ground with resinoid wheels.

Test No. 1

John Inglis Co., Ltd., Ordnance Division
Component: Bren breech block
Operation No. 2
Machine: Cincinnati
Milling cutter: No. C.T. 4131 A & B

Average production from regular ground cutter with a vitrified wheel, 80 components.

Production trial with two sets of new cutters finish ground on the o.d. with Lion A/4 resinoid wheel 60-2-AV-4 resulted as follows:

1st run: 185 components—Increase 231 per cent.
2nd run: 170 components—Increase 212.5 per cent.

Both sets of cutters were then carefully examined and it was noted that since the cutters had not been face ground they were quite rough and had a slight negative rake.

Subsequently these two sets of cutters were face ground with a Lion resinoid wheel 80-2-AV-4 and correct rake angle established, then finish ground on the o.d. with Lion resinoid wheel 60-2-AV-4. Production resulted as follows:

1st run: 200 components—Increase 250 per cent.
2nd run: 197 components—Increase 247 per cent.

The speed and the feed remained the same in each trial. It is reasonable to assume that if the speed and feed had been increased 5 to 10 per cent a further increase in production would have resulted as well as improvement in finish.

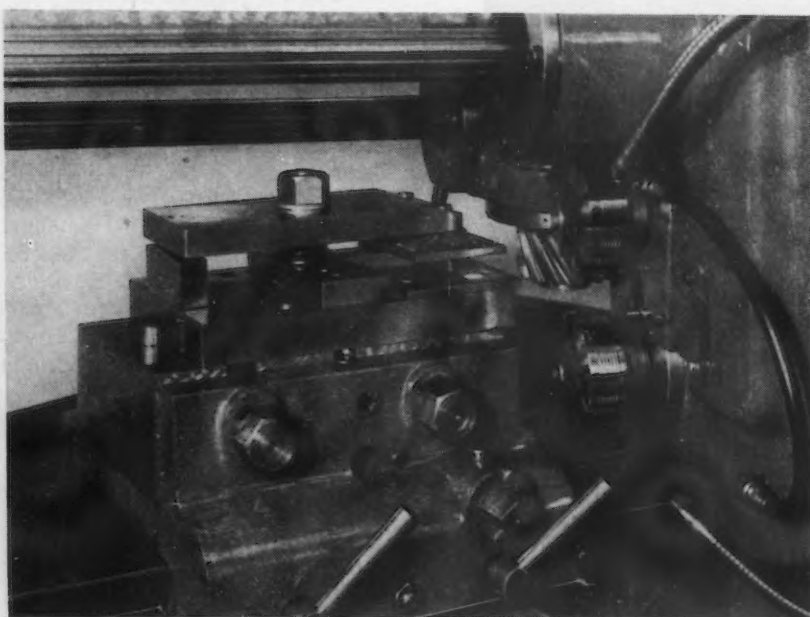


FIG. 8—In milling stainless steel turbine blades with the 4 in. spiral slab mill shown in this special "Modern" miller, a 47 per cent increase in cutter life between grinds was obtained by regrounding with resinoid bonded wheels.



FIG. 9—Shell end mill used in Test No. 3. See Fig. 10 for profilometer reading on this cutter.

Test No. 2

John Inglis Co., Ltd., Marine Division
Component: Turbine blades
Material: Stainless steel
Machine: Special miller made by Modern Machine Tool Co.
Cutter: 4 in. spiral slab mill.

Considerable difficulty was experienced in milling this type of metal until the cutter was regashed and face ground with a resinoid wheel 80-2-AV-4 and finish ground on the o.d. with a resinoid cup wheel 60-2-AV-4. On the first trial run this cutter produced 47 per cent more components per grind than the average run of vitrified wheel ground cutters, despite the fact that the feed was increased 2 in. per min.

Test No. 3

Otis Fensom Elevator Co., Ltd., Ordnance Division.
Component: 26 M.A. body mount
Material: Machine steel, weld flash and rivets
Machine: Sellers No. 1015
Cutter: 5 in. shell end mill, R.H., H.S. 2, 12 teeth
Feed: 0.018 in. per rev.
Depth of cut: $\frac{1}{8}$ in.
Cutter speed: 63 r.p.m.

Average production from cutters conventionally ground with vitrified wheels was six to seven components between grinds.

This shell end mill was regashed and sharpened at Cutting Tools and Gages, Ltd. Tooth face ground with Lion resinoid wheel 80-2-AV-4 and finish ground with Lion resinoid cup wheel 60-2-AV-4. Profilometer reading of depth of scratch on cutting edge averages $3\frac{1}{2}$ micro-in. (see Fig. 10).

Under approximate conditions used for cutters conventionally ground with vitrified wheels in our tool room, this cutter was used on 18 components. After each component was finished, the cutter was carefully examined for wear. The sharp corners did not show any wear until the seventh job was milled.

It is suggested that the corners be given a $\frac{3}{32}$ radius. Primary clearance should be 3 deg. for $\frac{1}{8}$ in. and 5 deg. for the balance.

Test No. 4

Otis Fensom Elevator Co., Ltd., Ordnance Division
Cutters: Right and left half size mills
Size: $8 \times \frac{3}{4} \times 1\frac{1}{4}$ in.
Grinding specification: $\frac{1}{16}$ in. land, 0.003 in. background, 0.004 in. per in. dish on side teeth, $\frac{1}{32}$ in. x 45 deg. chamfer

These cutters, Fig. 11, were regashed and sharpened at Cutting Tools and Gages, Ltd. with resinoid wheels, then run under the following conditions:

Speed: 33 r.p.m.

Feed: $1\frac{1}{8}$ in.

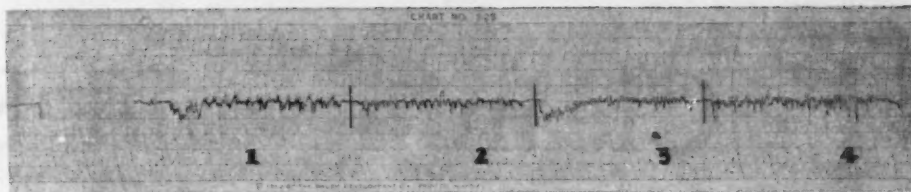


FIG. 10—Profilometer graph of four teeth of shell end mill (Fig. 9) ground with resinoid bonded wheel, showing good uniformity of edge and an average variation from peak to peak of 4 micro-in.

Production: 140 pieces.

The feed was then increased to $1\frac{1}{2}$ in. and production continued for 60 pieces to complete the job.

After this number of pieces the cutters showed very little signs of wear. Two teeth had a very slight build-up on the chamfer. It would appear that these cutters would have cut at least 75 more components and then be in better condition than average vitrified ground cutters. Comparison between the number of pieces produced per grind with the old method of grinding with vitrified wheels shows an increase of 65 per cent. Had the work been available to continue production with these cutters until they reached an average worn condition they would, without doubt, have seen an increased tool life of considerably over 100 per cent, according to A. S. Mitchell, tool engineering dept., who supervised the tests.

These production records serve to prove the exceptional value of the resinoid wheel method of tool and cutter grinding. It is revolutionary in every sense of the word. The average tool grinding department could be cut in half and still operate more efficiently than under the old method of vitrified wheel grinding.

No attempt has been made to embellish the facts of results achieved in the application of resinoid wheels. The time and dollar savings are apparent in every operation. If the reader will analyze each application and apply it to his own shop requirements, the savings will be obvious and startling.

ACKNOWLEDGMENT

The author wishes to extend his sincere thanks to the Carborundum Co., Dominion Abrasive Wheel Co., Ltd., and Lion Grinding Wheels, Ltd., who so liberally contributed their manufacturing facilities in the development of resinoid bonded wheels.

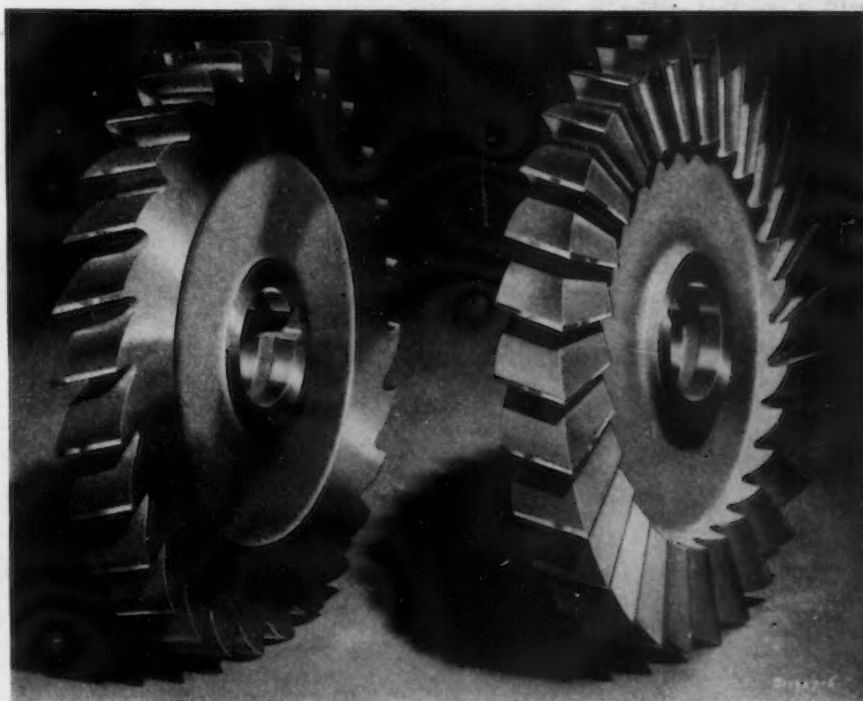


Fig. 11—Right and left-hand side mills used in Test No. 4.

Cleaning and Finishing

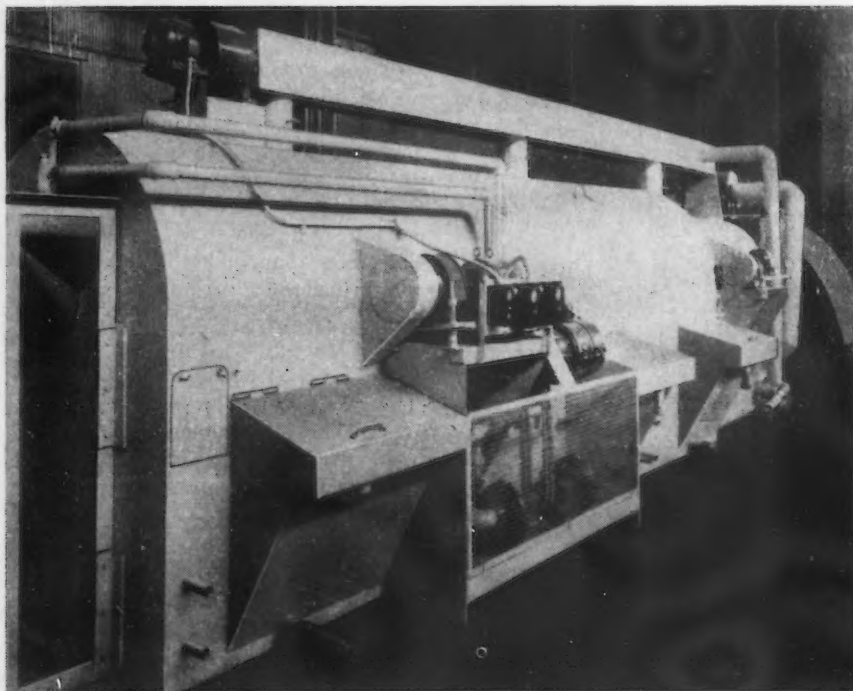


FIG. 1—Steel shell cases must be cleaned after each draw and before annealing to remove the drawing lubricant from the cases. This continuous drum type washer soaks, soaps, and rinses the cases through a spray arrangement. The cases are dried by hot air blast.

FIG. 2—For final washing, the cases are loaded in racks as shown here, passing through soap solution and clear water rinse sprays. At the discharge end of the cleaning unit, the cases are automatically dumped into a hopper.



THE production of ammunition depends on a multitude of operations, one of the chief of which is cleaning. The cleaning and finishing of steel and brass cartridge cases have presented problems never before encountered by the metal cleaning industry, and the effectiveness and speed with which such problems have been worked out during the past few years is a tribute in itself to the various manufacturers of cleaners, cleaning equipment, and associated products.

One of the best examples of new and different problems in cleaning came about when the switchover from production of brass cartridge cases to steel cases was made. The cleaning of brass is a much quicker operation, requiring less concentrated acid solutions and considerably less time. However, steel cases required just the opposite, and considerable difficulty was experienced in maintaining cleaning equipment because of the corrosive nature of more concentrated acid solutions at higher temperatures. This was overcome by complete redesign of the acid bath, utilizing new cleaning techniques and, as far as possible, non-metallic containers for the acid solutions.

Cleaning is one of the vital processes in the manufacture of ammunition, since the production of a .30 or .50 caliber cartridge case requires between 25 and 30 separate cleaning and finishing operations. These include washing, pickling after annealing and before drawing, drying, polishing, and many others.

One of the most difficult cleaning operations to fit into high speed war production has been the pickling of shell cases. This is especially true of the new steel cases which the steel industry and case manufacturers have developed during the war to relieve the critical shortage of copper. This pickling process involves the removal of scale from the cases after annealing and before the drawing. It consists of agitating the cases in a sulphuric acid solution, rinsing, and then neutralizing the action of the acid. The actual removal of scale from the cases is accomplished by

Cartridge Cases

By A. JAMES LEHMAN
Assistant Production Engineer,
N. Ransohoff, Inc., Cincinnati

three factors: (1) concentration of the sulphuric acid solution, (2) the temperature of the solution, and (3) the agitation of the cases in the solution. This last factor will be familiar to anyone acquainted with pickling sheets in a steel mill where the sheets are constantly agitated in the solution to reduce pickling time.

The pickling problem has been solved by the use of a batch pickling unit now widely applied to pickling steel cases. In this unit, a molybdenum-bearing stainless steel drum or a rubber lined drum is used for rolling the cases in the sulphuric acid solution. As the acid drains from the drum it flows into a tank from which it is recirculated by a small acid-resistant pump.

After the cases have been agitated in the acid long enough to remove the scale, usually about 10 min., the acid pump cuts off and fresh water for rinsing the cases is circulated through the drum. As the rinse water drains it is carried off to a sewer connection.

After rinsing, the cases drain for a few moments, and the rotation of the drum is reversed permitting them to leave the drum through a special discharge head, patented by the manufacturer. This patented head renders the unit exceptionally practical, because while it offers the advantages of a standard rolling drum, it eliminates the time-consuming unloading operation. Simply reversing the direction of the drum's rotation automatically empties it.

After leaving the rolling drum, the cases are carried by spirals welded in place through a cylindrical perforated screen where they are exposed to a neutralizing solution. The cases then can be automatically coated with the drawing lubricant if the manufacturer so desires.

This new batch pickling unit can hold the cases in the rolling drum until the scale has been completely removed, regardless of the time required. The time cycle for continuous machines, on the other hand, is set by the length of the drum, and once established can be changed only with-

... Problems necessitating redesign of equipment and novel thinking along the lines of cleaning shell cases for subsequent manufacturing operations have resulted from the conversion from brass to steel cases.

in narrow limits. Experience has shown that a continuous drum would have to be of impractical length to successfully pickle steel cases without greatly increasing the acid concentration and the temperature of the solution. These increases, while they will pickle the cases, will also pickle and destroy any metal from which it is practical to fabricate the unit.

Another advantage of the units of this type is the reduction in pickling time made possible by rolling the cases at a relatively high speed, thus increasing the agitation of the work in the pickling solution. These units also may be controlled completely by automatic switches, thus eliminating virtually all manual labor.

Cleaning and Washing

In addition to pickling equipment, many cleaning and washing machines are used in the manufacture of steel cases. After each draw and before anneal, for example, the drawing lubricant must be removed from the cases. This is done by a continuous drum type washer shown in Fig. 1, consisting of a cylindrical drum with spirals welded in place for carrying the cases through the unit. To insure thorough cleaning, the cases are completely immersed as they pass through the first stages of the drum, thus soaking and loosening the deposit. They are then soaked and rinsed by successive sprays. The liquid is pumped under pressure through pipes running down the center of the drum and the sprays are strong enough to remove the deposit which has already been loosened by the soaking. The

cases are then dried by blowing hot air on them.

The final washing operation after the last draw is generally handled in a conveyor type machine. This unit sprays the cases with a soap solution, rinses with clear water, and dries them with hot air. The cases are carried on closely spaced racks whose finger-like projections slant upwards to insure thorough cleaning and complete drainage, shown in Fig. 2. Loading can be handled efficiently and, as the fingers are carried around the discharge end, the cases are automatically dumped. Brass cases require certain variations in some of the machines described.

The removal of scale after anneal from brass, for example, is less difficult than from steel. For pickling brass cases most plants use a continuous drum type unit consisting of a cylindrical drum perforated at the drain sections, the work being carried by welded spirals. The pickling solution is brought into the drum by dip buckets which pick up the solution from tanks directly below the drum. The solution is kept at a constant height inside the drum by patented discharge heads which permit continuous circulation while maintaining a constant level of solution. After pickling the cases are washed in a neutralizing solution and dried.

Finishing Brass Cases

Perhaps the most spectacular contribution of the cleaning industry to the expanded production of brass cases has been in the finishing. This operation is the last cleaning process

Sixty-first in a Series of Articles on the Technical and Economic Aspects of Metal Cleaning and Finishing

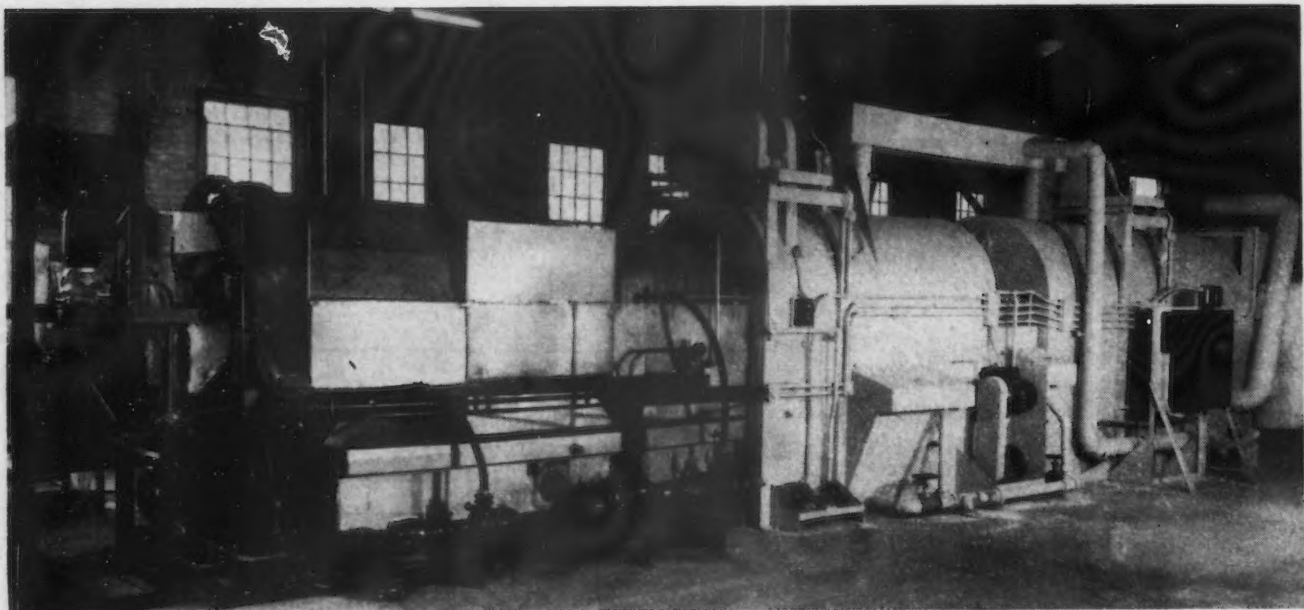


FIG. 3—The last cleaning operation before the cases are loaded consists of a roll in a weak acid solution, water rinse, soap wash, water rinse, and drying. This three-drum machine, where the drums are synchronized, performs these operations automatically in a continuous process.

before the case is actually loaded. It involves an acid roll in a weak sulphuric acid solution, followed by a water rinse, a soap wash, another rinse, and drying. Formerly these operations were begun in a tilting tumbling barrel, open at one end, and finished in a dryer. The technique involved a great deal of time and labor.

In order to meet the expanded production requirements of shell and cartridge case manufacturers, engineers of Ransohoff developed and put into successful operation an automatic batch finish pickler which performs this series of operations in one continuous process. This unit consists of three rolling drums, shown in Fig. 3, in which the cases are suc-

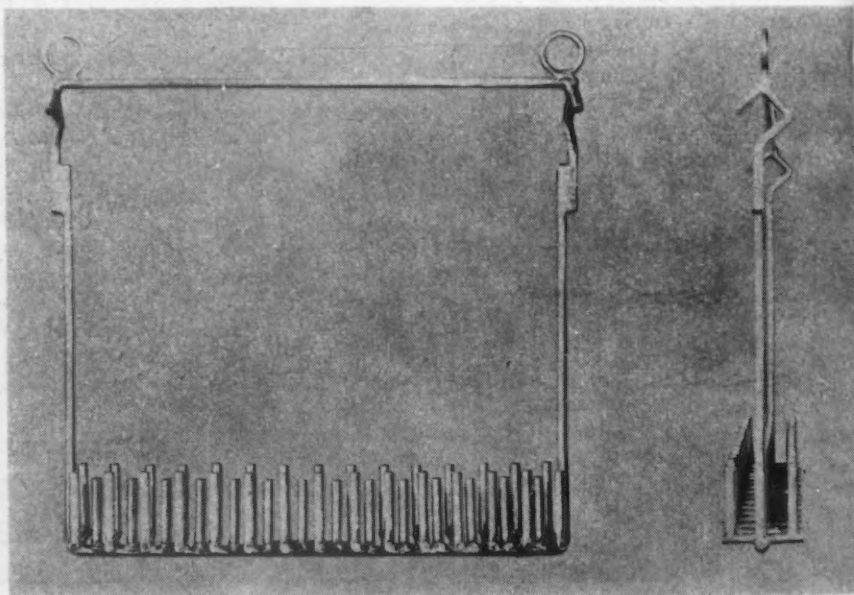
cessively pickled, soaped, and drained. Each of these drums is equipped with a special patented discharge head similar to that used in pickling steel cases. The head holds the cases in the drum while it rotates in a rolling direction and automatically empties the drum when the direction of rotation is reversed. The drums each discharge through cylindrical screens where the cases are rinsed after the pickling and soaping rolls and are dried after being drained.

A single master timing device controls and synchronizes the action of each drum. Thus, as the first drum is ending its cycle of reverse rotation and the cases are entering the second drum from the rinse screen, the second drum is beginning to turn in a

rolling direction. In this way, the work passes automatically from one drum to the next and the entire series of operations is performed in one continuous process.

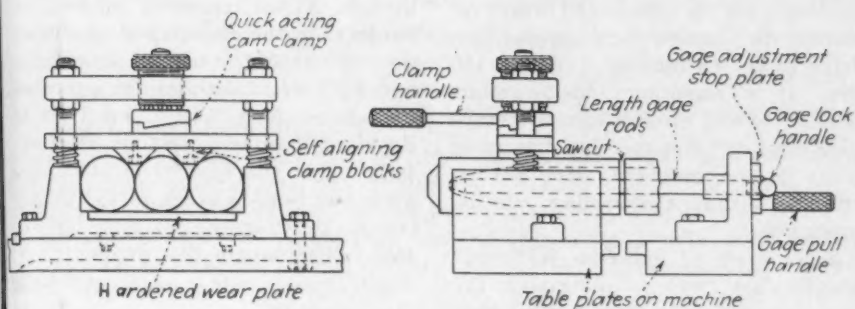
This batch finish pickling unit has made possible amazing savings in the production of small arms ammunition. One large company installed three of these units as an experiment. It was found that each of the three units turned out as much work as six tilting tumbling barrels and two dryers together used in the old method of finishing cases. It required only one man to operate all three units instead of 18 men needed to turn out an equal quantity of work before. Operating three shifts a day, 51 man days every day were saved.

COPPER Welded to Steel: Copper, one of our most critical metals, was held to a minimum use in building this chrome plating rack by welding SAE 1020 steel to the copper hooks with copper electrodes. It was necessary that the hooks themselves be of electrolytic copper as they rest on the work bars in the plating tanks and must make perfect electrical contact. The racks carry a heavy machine part that fits the pins in the rack and the pins must be held very close as the clearance tolerance is practically nil. Alfred A. Wald received an award for this idea in the Arc Welding News Contest, sponsored by the Hobart Brothers Co., Troy, Ohio.

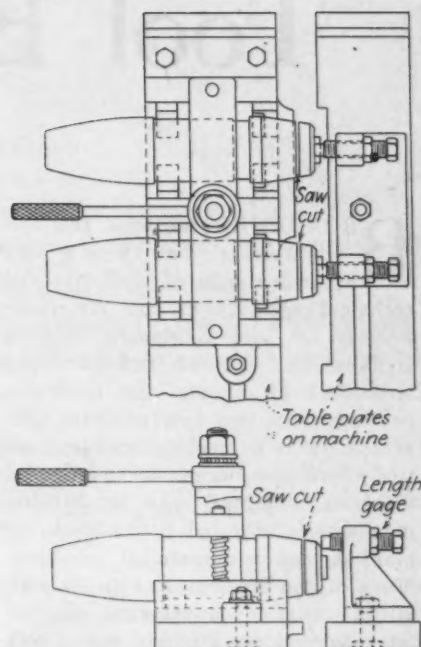


Shell Cutting Fixtures

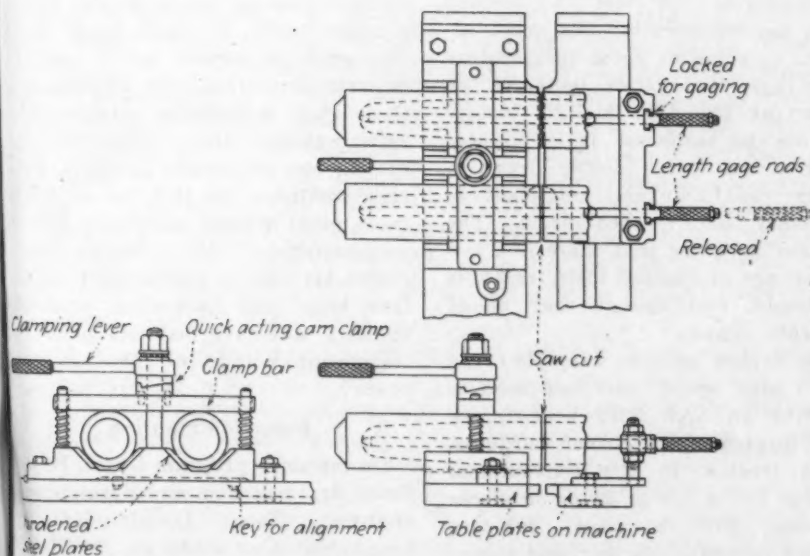
A SERIES of time-saving fixtures for flash sawing and nub cutting operations on 75 to 155-mm. shells has been developed by Racine Tool & Machine Co., Racine, Wis. Some typical examples of these fixtures, which readily suggest applications for products other than shells, are illustrated herewith.



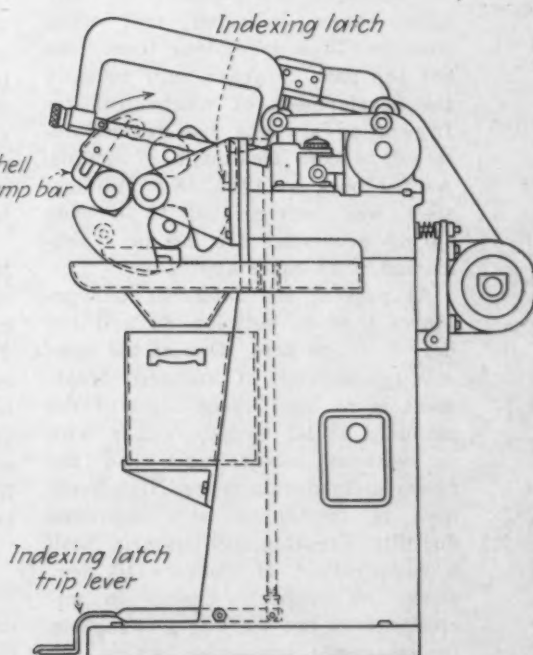
THIS fixture is used to saw flash from 90 mm. forged shells in batches of three. Production is about 54 an hour. Tripling of the gage lock handle frees all three end location gages simultaneously. After the shell is gaged and locked, the gage rods are removed for the cutting operation.



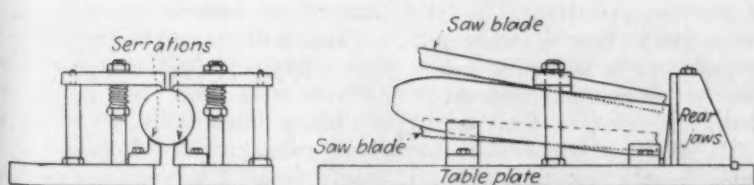
CENTERING nubs of 105-mm. shells can be cut off at the rate of 34 an hr. with this fixture. Total area of cut for both shells is 19.2 sq. in. The shells rest on wear blocks on V-plates at points where a slight marring of the surface does not affect acceptance of the shells. By altering the gage length, various sizes of nubs may be handled.



USE of this fixture for sawing flash on rough 105-mm. shells gives an output of 50 an hr. The inside of the shells is gaged by lock type gage rods, with each rod functioning independently. Shells are clamped in a quick acting vise.



ASPECIALLY designed Racine shell cutting saw for cutting nubs from various sized shells. Utilizing hydraulic power for cutting feeds and pressure, this unit can handle 120 105-mm. shells per hr. Indexing of the fixture is by means of a foot treadle and a gage which automatically places each shell in its proper position. As one shell is being cut, the operator unloads the finished piece and loads an uncut shell. A safety guard protects the operator from the saw frame.



THIS fixture is used for holding shells for splitting operations for test purposes. The shell is held at an angle to eliminate saw contact with full length of shell.

Tool Engineers Examine

BROADENED horizons for tool engineering featured two crowded days of well attended technical sessions of the American Society of Tool Engineers, held in Indianapolis, Oct. 11 and 12. Cold treatment of metals and induction heating were two new subjects presented at this meeting and an entirely new concept of the function of "tool engineering" was crystallized in a session devoted to problems of plant layout and material handling. Much of the sessions had to do with aircraft engine manufacture and the final session on Tuesday night was given over to talks by engineers of the Allison Division of General Motors.

Sub-Zero Treatment

At the opening session G. B. Berlien, chief metallurgist, Lindberg Steel Treating Co., Chicago, speaking on sub-zero refrigeration of high alloy steels, indicated that while work has been done along these lines for the past 20 years, only recently the development of mechanical refrigeration systems has revived interest in cold treatment of metals. As far back as 1914, 18-8 stainless steel was refrigerated to develop spring properties for use in a submarine hatch cover application.

At present the range of temperatures used is between 80 and 130 deg. F. below zero. One of the newest applications of sub-zero treatment is to high speed steel of the standard 18-4-1 variety, either with or without cobalt, and also the newer molybdenum types. High hardness is introduced with improved ductility. Treating such material with a temperature of minus 110 deg. shows no apparent change in microstructure but there is a change in the magnetic properties, which are improved, and an increase in size as well as hardness.

High speed steel tools are first hardened in the usual manner by heating up to 2300 deg. in two or three stages, then quenching oil, lead, salt or air until the temperature has dropped to at least 200 deg. F. It is highly important that a continuous

cooling rate be maintained while reducing the temperature in the refrigerating machine to a minus 110 deg. It is sometimes advantageous to slow up the cooling rate by wrapping the tool in paper but the main point to be observed, Mr. Berlien stated, is that the cooling rate be continuous.

The object of sub-zero refrigeration of alloy steels is to complete the transformation of austenite into martensite. This transformation is adversely affected if the tool is left in the air 30 hrs. or more after hardening. There is no apparent advantage, however, in cooling high speed steel lower than a minus 110 deg. Following the cooling cycle, which takes about 6 hrs. in order to stabilize the temperature, the tool is removed from the refrigerating box and is allowed to come to room temperature normally. It is then tempered or drawn at 1000-1100 deg. to produce the desired hardness. It is possible to give the tool a double draw, in which case sub-zero treatment is necessary before each draw. The speaker indicated that there is a low percentage of cracked tools from this treatment, even though they be of intricate shape.

Mr. Berlien cited an example of an 18-4-1 high speed steel tool used to machine an SAE 2330 heat-treated steel forging of 300 Brinell hardness. Tools treated in the conventional manner had a life of 25 or 30 pieces between grinds; tools sub-zero treated to minus 110 deg. and subsequently tempered at 1050 deg. had a life of approximately 90 to 110 pieces between grinds.

Air Hardening Steels

Many other steels respond well to sub-zero treatment, the speaker indicated. Air hardening steels like the 12 to 14 per cent chromium, 1½ per cent carbon steels have a tendency to retain considerable austenite. Such steels can be considerably improved in hardness by sub-zero treatment, even if left at room temperature a considerable length of time after quenching. The critical transformation point is minus 80 deg. F., al-

though if the material is low in hardness in the asquenched condition, the work should be cooled to at least minus 90 deg. Mr. Berlien indicated that there is a hazard involved in Rockwell hardness testing immediately after the first cycle since the work will tend to crack in the indentation. Drawing the work to 300-325 deg. will eliminate this danger.

Nickel carburizing steels, like SAE 2312, respond exceedingly well to sub-zero treatment. A gain of 12 to 15 points on the Rockwell C scale can be obtained by refrigerating to minus 120 deg. Tungsten shock steels can be case carburized and then subjected to sub-zero treatment to obtain high surface hardness and high core strength. The speaker mentioned an example of an aircraft pump plunger made of SAE 52100 steel that grew in service due to austenite transformation. By obtaining a thoroughly martensitic structure by refrigeration, this expansion of growth was overcome. In effect, sub-zero treatment in this, as in other cases, gives a more completely drawn microstructure. Mr. Berlien concluded his talk by predicting that before long very hardening room in industry will have installed some refrigerating equipment for this purpose.

Induction Heating

On the same program Dr. H. B. Osborn, Jr., research and development engineer, Tocco Division, Ohio Crankshaft Co., spoke on the Tocco process of induction heating. He analyzed in detail the relative merits and shortcomings of the three types of units now commercially employed for this purpose. In the motor-generator type machines made by his company, 10,000 cycles per sec. is standard and Dr. Osborn indicated that 95 per cent of induction heating applications could be handled with such a frequency, provided the proper controls were used. Setting up the oscillatory circuit by a series of spark gaps provides frequencies of 100,000 to 200,000 cycles per sec. but such a unit is limited in power to 32 kw. input and about 16 kw. output.

e New Techniques . . .

Vacuum tube oscillators give frequencies of 200,000 to 500,000 cycles and the power range commercially available is from 10 to 40 kw.

Dr. Osborn indicated that the work diameter is closely related to the frequency in induction heating. A $\frac{1}{2}$ in. round steel bar for example, can be through heated with 3000 cycles and surface hardened to a depth of 0.010 in. with 10,000 cycle current, but that a $\frac{1}{4}$ in. steel bar could not be heated inductively at all with 3000 cycle frequency. It would take at least 10,000 cycles to through harden it and 200,000 cycles to surface harden it. In the same manner, it would require 200,000 cycles to through heat a $\frac{1}{8}$ in. rod, and it is doubtful whether this small diameter rod could be surface hardened at any frequency. The speaker gave as the optimum minimum cycle frequency for heating only the empirical formula, $720/D^2$. In the case of Tocco units, where a cycle frequency of 10,000 cycles is employed, it is feasible to heat a large diameter bar throughout by using a low power input per square inch and a long time cycle, allowing the heat to reach the center by conduction from the outside.

The speaker illustrated many applications of induction heating and brazing, including the tipping of cemented carbide tools. A.P. shot has been given improved hardness by induction heating, equivalent to an increase in impact velocity of 100 ft. per sec. Induction heating is also being used for mouth annealing cartridge cases at the rate of 40,000 per hour. High explosive shells are now being made by induction brazing base plugs and caps into heat treated tubing, thereby eliminating the necessity for installing forging equipment. Dr. Osborn also cited instances of the application of induction heating to gear tooth hardening. With low frequency induced currents, it is not possible to predict what part of the tooth will heat first; it might be the root or the tip. Although higher frequency currents than 10,000 cycles will follow the tooth form more readily, the diameter of the gear has a large in-

... Eleventh semi-annual meeting of the American Society of Tool Engineers stresses new heat-treating techniques, production and design of aircraft and heavy duty gears, application of pneumatic and hydraulic devices to machine tools and the problem of plant layout and material handling methods to production engineering.

fluence on the path of induced currents and there are many gears that can be face hardened satisfactorily with a frequency of 10,000 cycles.

Post-War Business

Tool engineers will play an important part in the conversion of industry from war to peace goods production following the cessation of hostilities, C. Scott Fletcher, director of field development, Committee for Economic Development, told the banquet audience on Monday night. While insisting that nothing must interfere with the winning of the war, Mr. Fletcher stressed the fact that industry has the big problem of providing millions of jobs for returned soldiers after the war and must begin to lay plans now. Returning soldiers will be looking not for handouts from the government, but a good old fashioned American job.

Although there are at present 64 million people gainfully employed, Mr. Fletcher estimates that there will have to be 55 million jobs available after the war, allowing for retirement of older people and return to school of youth. In order to sustain this employment, production is what is needed. The first job that the tool engineer can do will be to shorten the period of transition between war production and peace production. It will be necessary to do this, Mr. Fletcher said, not only to provide jobs, but also to hold down inflation, since he estimates that there will be at the end of the war at least 90 billion dollars of savings available to buy consumer products. Aside from these savings there will be deferred demand for all kinds of products from automobiles to vacuum cleaners. In this regard, he pointed out that the automobile industry is planning a production of 18 million cars for the first

three years after the war in order to meet this deferred demand.

The speaker described the Committee for Economic Development as being purely a business group, divorced from government and organized for the purpose of pooling ideas relating to the creation of high standards of living. For example, it is estimated that a national income of \$150 billion (40 per cent over 1929 income) will have to be achieved in order to give employment to the 55 million people referred to previously.

C.E.D. Function Described

The CED is divided into two sections, one a research group which is studying economic and political conditions that will give the right "climate" for business, and a field division devoted to stimulating action on a community basis through the country. There is an industrial advisory committee on which 1000 leading corporations are represented. Big business intends to pass down the line to small business men the know-how of specific postwar planning worked out by specialized staffs of the larger companies. To this end several sub-committees have been formed—one relating to marketing problems, another to new materials and design and a third to industrial engineering. The latter group is planning to issue a book which will contain the best thinking of the big engineering firms, like Ford, Bacon & Davis Co. and George Armstrong & Co., on this subject. The general plan of the CED will be to supply local community groups with ideas and basic economic data on which individual planning can be made.

Already some "bold, courageous planning" has been made. Specifically Mr. Fletcher cited Servel, Inc., as announcing that this company plans

to set up a plant to employ 1750 people for the manufacture of a domestic air-conditioning unit to sell for \$1600. The plant size has been predicated upon the estimates of sales made by Electrolux dealers throughout the country.

James R. Weaver, past president of the society, and manager of the Louisville Ordnance Division of Westinghouse Electric & Mfg. Co., was toastmaster at the banquet. In introducing Mr. Fletcher, Mr. Weaver indicated that the most difficult job the tool engineer has ahead of him will be to retool industry for peacetime work. He predicted that the public will want something new and better and will not accept 1942 models after the war. Ray H. Morris, president of the ASTE, presided at the dinner.

Aircraft Gearing

In the session devoted to the subject of gearing, Charles G. Pfeffer, production engineer, Wright Aeronautical Corp., discussed the unusual design and production problems relating to aircraft engine gears. Very high loads must be carried on gears of extremely light and often intricate sections. In aircraft gears spur tooth form are largely used, and despite the fact that extremely heavy loads are carried per inch of face, tooth breakage is rare. Most aircraft gears fail by pitting at the tooth contact area. Hence such gear tooth proportions are calculated by using a modified Hertz formula for contact stress, rather than calculating the bending strength of the tooth by a modified Lewis formula. Full depth and long addendum teeth are preferred over the stub tooth form.

Many chrome nickel carburizing steels are used for aircraft gear, with depth of case ranging from 0.025 to 0.035 in. About half such gears are quenched in dies in order to minimize distortion. In fact, distortion following carburizing is one of the most difficult problems in gear manufacture and Wright Aeronautical has solved it largely by the use of quenching dies and subsequent grinding. Nitralloy steel gears, on the other hand, are subject to little warpage and no expensive quenching dies are therefore needed for such gears.

Shaving has been performed on an experimental basis, and Mr. Pfeffer illustrated a 16-tooth pinion now being successfully shaved by a subcontractor. Shaving has the advantage that tooth form accuracy is built into the cutter and is not dependent so much upon the skill of the operator as is the case with grinding. Because

shaved gears require much closer tolerance in hobbing, however, the hobbing time is generally doubled so that the net overall cost of shaved gears is about equal to that of ground gears, according to Mr. Pfeffer.

Heavy Duty Gears

Quite different problems are presented in the design and manufacture of heavy duty gears such as are used for marine propulsion and steel mill drives, according to W. P. Schmitter, chief engineer, Falk Corp., who followed Mr. Pfeffer. He remarked that gears up to 18 ft. in diameter are now being shaved successfully and economically. An even tooth bearing is obtained straight across the face of herringbone gears up to 36 in. wide. Such gears are usually made of cast steel, which is normalized and annealed prior to machining.

Mr. Schmitter indicated that substitute materials have been a very real problem to the manufacturers of large gears. However, any analysis of steel capable of being heat treated to required minimum physical properties can be used. The N.E. steels have worked out well, but for gears of large section, the alloy content must be increased to get the desired physicals, particularly on big gears which cannot be quenched. Such gears must be normalized and tempered before machining and may have a strength of 100,000 to 125,000 lb. per sq.in. and a hardness of 250 Brinell. The use of medium sulphurized steels has materially helped gear manufacture.

Mr. Schmitter believes that castings are best suited for very large gears and illustrated some of the foundry practice at the Falk Corp. Ample sized, well placed risers are required for these big gears. The ratio of the weight of the metal poured into the mold to the finished gear is often as high as 3:1. Much of Mr. Schmitter's paper was devoted to general problems of gear and speed reducer design and the effect of load conditions upon the calculation of gear strength. He indicated that a large amount of data on the calculation of gear tooth proportions had been accumulated by the American Gear Manufacturers Association, of which he is a former president.

Carburized Aircraft Gears

At a later session Richard S. Kegg, supervisor of the gear laboratory of the Allison Division of General Motors, discussed the manufacture of aircraft gears which he described as "a bunch of gears that will almost

not run together." Few aircraft gears can be quenched without the use of dies and because of the thin web sections involved and close tolerances, the dimensions of die locating surfaces must be closely held in machining the gear blanks in the soft state, if distortion is to be avoided. Carburizing and hardening causes the most trouble, he said. The difficulty is increased when two different gears on the same component have to be case hardened to different depths. He illustrated an example where one gear was case hardened to a depth of 0.020 to 0.030 in. and another to 0.015 to 0.020 in. In this instance, the work is carburized in two steps. The two sets of teeth are first carburized to the lower depth, then the gear of lower depth of case is protected by copper plate while the remaining depth of case is completed for the other gear.

Mr. Kegg spent much of his talk explaining how highly stressed critical gears had the involute tooth form modified in grinding to produce a fullness above the pitch circle or the addendum of the gear teeth so that deflections under load will restore the teeth to the theoretical involute form. This fullness range is relatively short compared to the active profile. For example, on a 36-tooth, 6d.p., 25-deg. p.a. vibration damper gear, the involute profile chart would show a deviation of 0.0002 to 0.0008 in. at the tip and from 0.0007 to 0.0013 in. at the fullest point above the pitch line. At the lower end of the line of action, the fullness is zero. Such modifications in tooth form can only be made with form type grinders, since with generating type grinders, employing rack shaped wheels, the only modification possible is in the pressure angle. In the former type of gear grinders, templates are used to guide the wheel dressing diamonds in trimming the wheel.

Form grinders are more susceptible to burning than generating type machines and all precautions must be taken in the proper training of personnel. Some of the factors to be taken into account by the operator were listed by Mr. Kegg as: Type of wheel, type of coolant, rate of stock removal, condition of the diamonds and systematic dressing of the wheel. The ratio of spindle speed to table traverse speed is highly important. Allison has devised a form of recording disk, with paper record on which a punch mark is made at each work table stroke. The number of passes made by the grinding wheel

are therefore a matter of record for each gear finished.

Allison Engine Design

Earlier in the same program, Dimitrius Gerdan, engine development engineer of Allison Division, explained the design changes that have been made in the V-1710 model liquid cooled engine to improve its performance and make the design more flexible for various applications of the same basic power unit. By turning the crankshaft end for end, for example, the rotation can be changed from right to left hand without changing the firing cycle. The propeller reduction unit may be either bolted to the engine crankcase or put at the end of a 9-ft. shaft extension, as in the Bell Airacobra. Likewise the accessory housing is a complete unit mounted at the rear of the engine and may be equipped for either sea level or altitude supercharging.

Much of Mr. Gerdan's talk was concerned with the relation of fatigue life of aircraft engine parts to surface finish. Since practically all failures that occur in service are fatigue failures, every effort is made to eliminate sharp corners in design and scratches in machining. Even minute scratches left by polishing operations have a bearing on fatigue life and the speaker illustrated an engine part on which a 15-20 per cent increase in fatigue life had been obtained by changing the direction of scratches from at right angles to parallel to the direction of the principal stress.

Compression prestressing the surface of critical parts considerably reduces surface vulnerability since all fatigue failures are due to tension stresses. A 20 per cent increase in the life of crankshafts has been obtained experimentally by shot blasting. Shot blasting has also increased the endurance limit of fork and blade connecting rods almost 11 times. Nitriding produces a similar effect, since the surface layer tends to expand and set up compression stresses. Comparative endurance limits of connecting rods cited by Mr. Gerdan were as follows:

Polished rods	75,000 lb. per sq. in.
Polished and blasted..	90,000 " " "
Polished and nitrided..	120,000 lb.

In both the latter cases, polishing manhours have been reduced 35 per cent. Nitrided rods have been used in production by Allison since November, 1941, and no failures have been reported in combat. Nitriding is also being applied to other engine parts.



RAY H. MORRIS

President of American Society of Tool Engineers and vice-president of Hardinge Brothers, Inc.

Air and Hydraulic Power

In a session on tooling for the inexperienced operator, John C. Cotner, president, Logansport Machine, Inc., illustrated the application of pneumatic and air-hydraulic devices to machine tools. After briefly reviewing the history of the development of the air compressor, he described a standard air cylinder and the two types of piston packings used, the cup or self-adjusting type and the squeezer type. Because of the presence of moisture in compressed air, a rust resisting lining is required in the tubing from which the cylinder is formed. A brass liner or a chromium plated surface are frequently used for this purpose.

Although the usual shop line pressure is 100 lb. per sq.in., occasionally air pressures up to 400 or 500 lb. are employed. Careful design of high pressure cylinders is required, Mr. Cotner warned, inasmuch as there is great danger should failures occur. While the average chuck operating air cylinder is made of cast iron, the speaker cited instances of magnesium cylinders being operated at speeds of 4500 r.p.m. Similar types of rotating cylinders may be used for expanding internal mandrels in shell turning operations, as well as for external chucking. When precise feed control is desired, an air cylinder can be combined with a hydraulic cylinder having a closed circuit. A metering valve in the circuit allows precise control of the advance of the com-

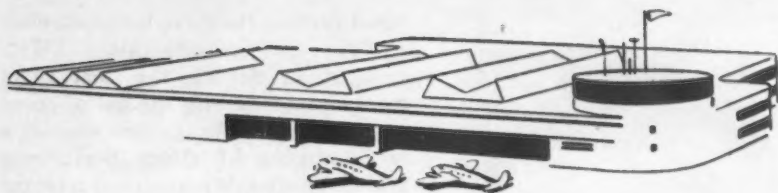
bined pistons, the force being supplied by the air pressure alone. With straight air circuits, the same effect can be obtained with the aid of speed control valves. Mr. Cotner showed a large number of slides illustrating typical pneumatic systems on machine tools and also on a pressure quenching machine.

A large number of applications of hydraulic power to machine tool actuation and fixture control were illustrated by L. R. Twyman, manager of the machinery products division of Vickers, Inc. He predicted a greater tendency toward single-purpose machines in the post-war period, using either air or hydraulic power mediums for feeds and automatic clamping. He urged tool engineers to concentrate on the conversion and redesign of existing machines to high production single-purpose units. Power operated fixture control is one of the first points of attack. For this purpose, Mr. Twyman said that hydraulic power is particularly applicable since the fixture cycle may readily be interlocked with the main hydraulic circuit of the machine.

The principles of hydraulic power are well known, the speaker pointed out, but the opportunity for applying these principles are often overlooked. The advent of standardized pumps and controls offer an easy way for accomplishing this, but the combinations possible have not yet been exploited fully. Designers with a "Tinker Toy" or cross-word puzzle type of mind should relish the opportunity of working out the myriad possibilities of obtaining interlocking multiple movements with sequential controls through the medium of hydraulics and electricity. Aside from the well known hydraulic feed functions, Mr. Twyman pointed out the possibilities of clamping, chucking, stripping and actuation of locating dowel pins through hydraulic power and the indexing of fixtures by fluid power motors. Very precise dimensional control can be attained by the use of hydraulic power with mechanical can feed control, as in the case of the aircraft engine cam miller. He exhibited a host of slides illustrating special-purpose machines with hydraulic controls.

Material Handling Session

For the first time at any ASTE convention, a session was scheduled on material handling and plant layout. The keynote was sounded by R. W. Mallick, manufacturing engineering department, Westinghouse (CONTINUED ON PAGE 138)



Tool Distributors Study Declining Market

Wright Machinery & Supply Co.,
Cleveland.

N. P. Lloyd Cited

Expressions of deep appreciation were extended by resolution to N. P. Lloyd, Lloyd Machine Tools, Inc., Philadelphia, for his single handed effort in forming machine tool panels throughout the country to aid the Ordnance Department of the U. S. Army in the selection of proper tooling in the early days of the war production program. A citation of merit, signed by Maj. Gen. Levin H. Campbell, Jr., chief of Ordnance, was also presented to Mr. Lloyd on behalf of the Ordnance Department. This presentation was made by Brig. Gen. H. F. Safford, chief of the production service branch of the Office of the Chief of Ordnance, who was one of the speakers.

The group was welcomed to Canada by C. S. Bradeen, Canadian Fairbanks-Morse Co., Ltd., and president of the Canadian Machine Tool Distributors Association, who spoke in the absence of Thomas Arnold, machine tool comptroller of Canada. In a letter addressed to the group Mr. Arnold acknowledged the tremendous amount of support from Washington given Canadian industries in the period between Dunkirk and Pearl Harbor. He emphasized the engineering service rendered by Canadian dealer organizations in the tooling up period

and their contributions to the economic welfare of the Dominion and the future good of the machine tool trade. Mr. Bradeen pointed out that Canada, because of its relation to both the United States and Great Britain and its small size, can be a laboratory where the liquidation of war industries and the disposal of surplus supplies may well be worked out first after hostilities cease.

Speaking of the post-war situation, General Safford said that the War Department has purposely avoided public discussion of future plans with relation to government owned machine tools because the war is not yet over and no sound plan for conducting the war can be predicated upon the enemy collapsing in the near future. In fact, he predicted that war production in 1944 will be greater than that for 1943. The situation today, he said, is much different than in 1918, however. Then there were about 24,000 war contracts in force totaling about \$6 billion; now there are 225,000 contracts in force to the aggregate amount of \$75 billion.

Since the emergency, various government agencies have acquired about 126,000 machine tools valued at \$408 million. Of these, the Ordnance Department owns 86,000 plus some 30,000 other industrial equipment and \$85 million worth of special jigs and fixtures. In addition there is another

REDISTRIBUTION and salvage of machine tools, problems of renegotiation and the post-war market were the principal topics of discussion at the 19th annual meeting of the American Machine Tool Distributors' Association, held at the Seignior Club, Montebello, Que., Oct. 14 and 15. A goodly number of representatives of the 133 member companies were on hand in this rustic spot to talk over informally some of the chief headaches of this sales and service branch of the industry.

The group elected Albert M. Stedfast, Stedfast & Roulston, Inc., Boston, their new president, succeeding Dan Harrington, Harrington-Wilson-Brown Co., New York. Other officers elected were: First vice-president, A. B. Einig, Motch & Merryweather Machinery Co., Cleveland; second vice-president, George Habicht, Jr., Marshall & Huschart Machinery Co., Chicago, and secretary-treasurer, C. C. Brogan, W. E. Shipley Machinery Co., Philadelphia. New members added to the executive committee are: E. C. Elstad, Siefert-Elstad Machinery Co., Dayton and Cincinnati; Robert S. Page, Henry Walke Co., Norfolk, and O. W. Johanning, Colcord-

\$100 million worth of machines in private plants being operated for the Army which must some day be returned to a peacetime basis. General Safford acknowledged that it is paramount to obtain the advice and assistance of the machine tool industry in working out the post-war disposition of this machinery when the time is ripe.

Surplus Tool Disposition

Admitting that there was a large inventory of surplus equipment now on hand, Col. Haviland Wright, chief of the redistribution and salvage section of the Office of the Chief of Ordnance, discussed the present policy of the War Department as regards the disposition of this machinery. The plan in force is predicated upon getting all available equipment into use. Monthly lists of such machines are now being issued and are being broadcast to all the services. Critical items on these lists are first circularized for 20 days and are then turned over to WPB. Two months thereafter, if no disposition has been made of them, such equipment is available to anyone contributing to the civilian economy. Colonel Wright indicated that many tools had been moved under this plan.

Army Service Forces has recently asked for and obtained from the War Department increasing authority to dispose of non-repairable machinery, such as the many machines left in the arsenals after the last war. These machines are now being classified as scrap and turned over to salvage officers in the various Ordnance district offices for disposal. After useful items like motors and controllers are stripped from them, the main castings are broken so that they will assuredly enter commercial scrap channels. Sales of usable machines will be normally distributed within OPA ceiling prices or 80 per cent thereof, depending upon the condition of the tools. This regulation is intended to prevent purchase of such machinery for speculative purposes. In the end, the Ordnance Department will have succeeded in getting rid of all the "junkers" and will have on hand only the most modern equipment.

Colonel Wright envisions the continuing need for a "normal" production of machine tools for replacement purposes and to take care of new production facilities to meet the exigencies of war. In fact, he said the War Department, far from wanting to shut down the machine tool industry (as some have concluded), is somewhat worried over the possibly too rapid conversion of machine tool manufacturers to direct war work.

Speaking on the same topic, A. G.



A. G. BRYANT

● President of Bryant Machinery and Engineering Co. and past president of the American Machine Tool Distributors' Association whose "able and intelligent leadership" in handling the industry's problem of renegotiation was extolled in a resolution brought before the distributors' convention at the Seignior Club.

Bryant, Bryant Machinery & Engineering Co., Chicago, said that a recent study made by a committee of the National Machine Tool Builders Association in cooperation with the various service branches revealed the need for a production of \$325 million worth of machine tools in 1944, aside from the surplus equipment now being disposed of by the War Department. Mr. Bryant himself considers this figure very conservative since he believes that the volume of machinery estimated for ordinary commercial purposes is entirely too low.

At this meeting there was a definite concern expressed that the government intended to shut down the machine tool industry. The remarks of Colonel Wright and Mr. Bryant dispelled this fear, and the latter added that there was a plan afoot to have manufacturers continue to build a number of machines on a moderate production basis for future needs, before they get too involved in subcontracting on direct war products. Not long ago, however, screening of orders by WPB, particularly by certain regional offices, had been carried to the point where new orders almost ceased for a short period. This attitude is being changed.

Certainly no excess production of machine tools is sought or desired at

this time, Mr. Bryant declared, but where manpower savings can be created by the installation of new machines, there should be no bar to obtaining the necessary priorities. C. E. Wilson, vice-chairman in charge of production of the WPB, has recently disclaimed a policy to prevent such purchases. As a result, within the last fortnight a letter has gone out from Washington to all regional WPB offices which in effect puts it up to the local offices to prove that such machines are *not* needed in the war effort. Heretofore, the reverse situation prevailed.

Mr. Bryant then launched into a dramatic play-by-play account of the struggles of the machine tool industry with various price renegotiation boards and stirred up a discussion which lasted for hours but which cannot be reported here. It can be said, however, that based on what has transpired to date, the profits, after taxes, which the price adjustment boards are asking some distributors to accept as a result of renegotiation range between 0.60 and 1.00 per cent of gross sales in 1942. (The average dealer profit in 1942 on gross sales, after taxes, was only 1.68 per cent.) Mr. Bryant was able to tell his audience that there was good reason to believe that the House Ways & Means Committee, which resumed hearings on this subject in early September, would report out some remedial changes in Sec. 403 of the 1942 Revenue Act relating to renegotiation. Despite the feeling of discouragement and resignation which many members of the machine tool industry feel because of the slow process of law making and revision, Mr. Bryant said there was more grounds for optimism now than when the law was passed 18 months ago. He sees not only the fate of manufacturers and distributors of machine tools vitally involved, but considers that the national welfare is at stake.

Other problems discussed informally by the distributors concerned salesmen's commissions under the revised ruling of the Treasury Department. The original ruling of Sept. 4 issued by the salary stabilization branch of the Bureau of Internal Revenue is so ambiguous on this score that a clarification has been promised by the end of October. Should the ruling hold, Form SSUI will have to be obtained from this branch and filled out for every salesman if the same basis of compensation is to be continued. Other topics included proposed uniform conditions of sale and the problem of split commission sales where distributor organizations in different territories are involved in a sale.

... Electric Furnace Operators

... First annual conference covers charging methods, refractories, scrap utilization, slag making and oxidizing, alloy supply, etc.

THE first annual conference of Electric Furnace Steel Committee of the Iron and Steel Division of American Institute of Mining and Metallurgical Engineers, attended by nearly 400 electric furnace operators, melters production men, and metallurgists, was held in Pittsburgh on Oct. 1 and 2. The unexpectedly large attendance at this first A.I.M.E. meeting of electric furnace men was extremely gratifying in that it got the meetings off to a fine start and was an accurate indication of the interest in and importance of the electric steel making industry.

In opening the meeting, Charles W. Briggs, chairman of the conference committee, outlined the purpose of the new A.I.M.E. electric furnace steel committee and its annual conferences and turned the meeting over to Harry W. McQuaid, chairman of the executive committee of the group. Mr. McQuaid's remarks were brief because of the limited time and the coverage that was desired of the meetings, but he outlined the parallel of electric furnace steelmaking to open hearth steel production and the desire of the organization to get those interested in electric furnace operation to take part in the activities of the committee.

Upon completion of the remarks by Mr. McQuaid, the joint acid and basic technical session got under way under the chairmanship of Norman I. Stotz, of Universal-Cyclops Steel Corp., and the co-chairmanship of Harry A. Schwartz, National Malleable & Steel Casting Co. These meetings lasted throughout the morning on Friday. For the purposes of the organizational record and general interest, papers of an historical nature were read on the development of carbon electrodes, the development of electric furnace steel industry refrac-

tories, and a tracing of the trends in design and construction of the electric melting furnace.

R. L. Baldwin, sales development manager of the electrode division of National Carbon Co., traced the development of the electric furnace and showed how its development hinged on improvements in electrode construction and quality. He pointed out that in 344 foundries in the country, 276 have a total of 508 electric furnaces, and that from accounting for 0.79 per cent of the steel ingot capacity in 1930, 68 electric steel plants with 201 furnaces now account for nearly 7 per cent of the steel capacity. With rated capacity now at about 6,100,000 tons per year, production is actually higher than capacity and this doesn't include production of high frequency induction furnaces. However, Mr. Baldwin pointed out that at present German and Russian electric furnace steel totals about 11 per cent of the total steel production of these nations. In discussing the economics of the electric furnace, Mr. Baldwin stated that he was firmly convinced that large electric furnaces, with consequent greater capacities, can compete in certain areas of the United States with open hearth furnaces of the same capacity that melt cold charges.

Samuel Arnold, American Bridge Co., discussing developments in electric furnace design and construction, stated that developments in electric furnace construction since 1939 have been as extensive as during the 20 years previous. From the standard 6-ton unit of 1918, construction has developed until today the standard furnace is of 70 tons capacity with many features such as tilting forward and backward for metal and slag taps and complete water cooling not included in the earlier designs. Looking forward a bit, Mr. Arnold pre-

dicted that the immediately imminent design improvements would include improved feeding and charging systems, circuit breakers, power swings, better power surge control, and finer regulation equipment. With production the number one requisite today because of the war, the electric furnace man cannot forget costs. Techniques learned now will be a big factor in cost reduction after the stress is off production. Studies by the individual operators on most economical charging methods, shorter furnace cycles, and other phases of operation will pay dividends when costs again become the main factor.

Top Charging Favored

The mechanical design and electrical design of the arc furnace were covered by papers read by representatives of furnace builders and electrical equipment manufacturers. It was pointed out by F. W. Brooks, Swindell-Dressler Corp., that furnace design trends were toward top charging, and figures on costs of operation proved this. On four medium sized furnaces, two built for top charge and two for door charge, careful records of costs were maintained for a year, favoring top charging of electric furnaces by an average of about \$3.05 per ton.

In a paper read by Frank T. Chestnut, Ajax Electro-Thermic Co., the modern induction furnace was described. Mr. Chestnut stated that the trend in induction furnace design is toward big banks of small furnaces, and the development of better motor generator equipment permits the spread of induction furnace steel making. Economics favor induction furnaces in duplexing, especially as alloy demands increase, and in foundries that use centrifugal casting. The fact that the induction furnace serves both as a steelmaking medium and as a ladle in transporting it within the shop saves time, expensive ladle equipment, and the loss of metal heat

S Examine Operational Problems

caused by transferring the metal from the furnace to the ladle.

In discussing the shortcomings of electric furnace steelmaking, Harry W. McQuaid pointed out that electric steelmaking was the most expensive way of melting, but it gets desired results. Costs of installing, power, and repairs are high, and the electrical equipment is so complicated that a melter must almost be an electrical engineer. Mr. McQuaid's suggestions included a study of top charging with a magnet; the use of kw-hr. indicators instead of or in addition to ammeters; placement of the power-factor meter on the control board instead of in the transformer room, and other similar ideas that will be of aid to the practical man on the melting floor.

In the afternoon session, a joint acid and basic technical meeting, A. L. Feild, Rustless Iron & Steel Corp., and Henry D. Phillips, Lebanon Steel

Foundry, were chairman and co-chairman respectively. The discussions at this session were a continuation of those in the morning and covered refractories, electrodes, scrap, slag-making and oxidizing materials and alloys.

Electric Furnace Refractories

Three papers were presented on refractories for electric furnaces. Dr. R. P. Heuer, of General Refractories Co., discussed the requirements of good refractory materials and proper installation of refractories. For bottom linings, he stated that the ram-

med magnesite bottoms had proved highly successful since they are obtained in a prepared condition and installed through the aid of a water-sodium silicate binder. The use of the binder should be kept down as low as possible so that the bottom will have a maximum of refractory material. The analysis of this type of refractory runs generally as follows: MgO, 81 per cent; CaO, 5 per cent. Fe₂O₃, 4.5 per cent; Al₂O₃, 2.5 per cent; and SiO₂, 7 per cent.

The use of slag in making the bottom is unnecessary. The prime requisite of good bottom making with the rammed magnesites is in keeping the bottom as dense as possible. In other words, a high magnesite-low binder ratio increases the weight per cubic foot of refractory obtained. This can be done by carefully choosing the magnesite, using about a 60-

(Continued on page 136A)

THE Saturday noon session on acid steel, with R. H. Frank and G. A. Lillieqvist as chairman and co-chairman respectively.



Electrochemists Study Wartime

IN an unusually large wartime turnout, close to 400 attended the eighty-fourth meeting of the Electrochemical Society Oct. 13 to 16 in New York. Greatest interest centered about the session on "Strip Steel Electroplating," in which seven papers were presented on electrolytic tinplating, electrogalvanizing, and nickel and tin-nickel alloy coatings. It was pointed out that through the shift to plating before fabrication, control of the plating industry is passing out of the hands of the automotive industry into the hands of steel producers.

Other sessions were held on electroplating iron, electrolytic cells, corrosion, and electro-organic chemistry.

Ivan S. Bloch, Market Development Chief, Bonneville Power Administration, spoke at the general luncheon on Friday on the relationship between electrochemistry and irrigation. The vast blocks of electric power, developed as a by-product of the Federal irrigation schemes have boosted the electrochemical industry to such an extent, Mr. Bloch said, that products that used to be turned out in pounds are now being turned out in tons. The great demand for food, now and after the war, means more irrigation, and more irrigation means more and cheaper electrochemical products, he said.

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Reducibility of Alloying Elements

THE Society's Joseph W. Richards Memorial Lecturer, Dr. B. D. Saklatwalla, Chairman, Alloys Development Corp., Pittsburgh, and from 1919 to 1935 Senior Vice President of Vanadium Corp. of America, spoke on "Thermal Reactions in Ferro-Alloy Metallurgy, the Basis of Alloy Steel Development." After reviewing the history of alloy metallurgy and discussing the merits of carbon, aluminum and silicon reduction, Dr. Saklatwalla pointed out that several years ago Professor Guertler of Gottingen, Germany, suggested the possibility of graphically representing the relative reducing

powers of the elements. He proposed plotting their heats of formation against their valencies. In accordance with this idea, the metallurgically useful elements are plotted in Fig. 1. The heats of formation are recorded on a scale along the ordinate, and the valencies along the abscissa. When the heats of formation of the various elements are recorded as points on the chart and connected by lines with the zero point, there is obtained for each element a slanting line forming a different angle with the abscissa. The element with the steepest line of inclination, with a greater angle, will reduce one with less steep inclination.

Thus it becomes possible to set up a thermochemical series for the degree of reducibility of the elements. When one element, for instance manganese, occurs in different valencies, forming various oxides— MnO , Mn_2O_3 , etc., the line for it on the chart will change the angle of slope at the point representing the values of the heats of formation of the various oxides. The case may also occur that the higher oxide of an element may be reduced by another to a lower oxide, when, for the lower valency, the heat of formation may be such as to give a line more steep than that for the reducing agent, so that further reduction to the elemental stage could not proceed.

The relative values of the reduction propensities of the elements, as obtained from the angle of steepness in Fig. 1, being derived from fundamental bases, correspond closely to actual metallurgical experience. The chart has the advantage of affording a means of quickly visualizing reduction possibilities of the various elements. It is particularly useful in cases of elements with varying valencies combining with different numbers of oxygen atoms. It also helps to clarify the reactions taking place in metal refining operations where undesirable metalloids or metals are eliminated from the metal bath by the action of oxides in the slag.

The angle of steepness of the lines in Fig. 1 have been actually measured and the elements tabulated in accordance with their decreasing slope. In this tabulation, the steel alloying elements classify themselves into groups (Table I) displaying similar metallurgical behavior. The classification seems to be useful in evaluating not only reducing agents, but also the efficacy of the commonly used deoxidizers. Group I is made up of the elements which are the most potent deoxidizers—in fact, too potent to be practically useful in their pure form. Group II represents elements which are less potent deoxidizers and func-

TABLE I

Elements Grouped According to Reducibility, From Chart in Fig. 1.

Group I Angle of slope 68 to 65.5 deg.	Group II Angle of slope 65.5 to 57 deg.	Group III Angle of slope 58 to 47 deg.	Group IV Angle of slope 46 to 30 deg.
Calcium Magnesium Strontium Barium	Aluminum Titanium Vanadium Silicon Boron	Manganese Chromium Zircon Phosphorus Molybdenum	Iron Tungsten Nickel Copper

e Developments

... Investigation stemming from the revolutionary changes in plating of strip steel, reducibility of steel alloying elements, and improved iron plating methods were among the subjects of reports presented at the Electrochemical Society convention.

tion as such only secondarily. When added in sufficiently large amounts, they form important true alloys with the finished metal. It is rather remarkable that all the elements in this group are constituents of the addition agents recently so highly recommended for steel; namely, boron containing alloys of the so-called "Grainal" type. The action of these new complex addition alloys is not yet clearly understood, but since the grouping under discussion is based upon angles of slope derived from heats of oxide formation with due reference to valency, it seems possible that the effects achieved by them in steel may have some relation to the values of their heat of formation. These elements in the thermochemical series lie close together and their angles of slope are within the range of 65.5 and 57 deg.

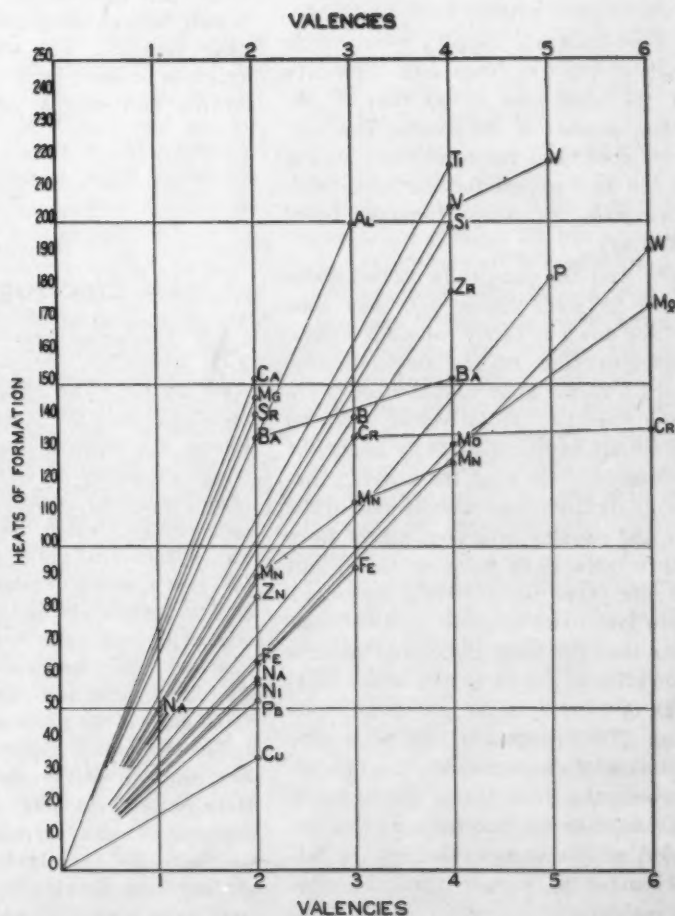
Pointing out the wide variations in initiating temperatures for a reduction reaction, which vary from 770 deg. F. for the reaction between sodium peroxide and aluminum, to 1040 deg. for barium dioxide and aluminum, 1875 deg. for commercial iron scale and aluminum, and 1740 to 1920 deg. for most other oxides such as those of manganese and vanadium, Dr. Saklatwalla said that such wide variations in the initiating temperature must be caused by fundamental differences in the properties of the oxides. Since the peroxides enter into the reaction at a much lower temperature than the more stable oxides, it seems plausible to assume that the initiating temperature bears a relation to the oxygen tension, or, in other words, to the dissociation capability of the oxide. The temperature at which oxygen tension of 0.21 atmospheres, when dissociation of free oxygen begins, is reached varies with the nature of the oxide. The initiating temperature very likely is quite close to this dissociating temperature of the oxide, the resulting free oxygen initiating combustion of the aluminum.

Tin-Nickel Plated Steel in Corrosive Foods

"CORROSION of Tin-Nickel Alloy Coatings on Steel in Canned Foodstuffs," was presented by H. R. Copson and W. A. Wesley, International Nickel Co., Bayonne, N. J., at the highly interesting session on strip steel plating. In their investigation, the authors had observed galvanic behavior of steel coupled with tinplate, tin-nickel alloy coatings and nickel, during exposure to typical corrosive canned foodstuffs under anaerobic conditions. Results indicated that

the alloy coatings were anodic to bare steel in four of five foods tested and not appreciably cathodic in the fifth. This, together with observations on degree of corrosion which occurred led to the conclusion that nickel-tin coatings only 0.00002 in. thick are potent, substituting for tin coatings three to four times as thick. The tin content of the alloy coating is essential to overcome the noble potential of pure nickel and take advantage of marked inhibitory effect of tin com-

FIG. 1—Graphic representation of relative reducing powers of the elements. Heats of formation, in deg. C., are plotted against valencies and connected with zero point to give a slanting line. The element with the steeper line of inclination, forming a greater angle with the abscissa, will reduce one with less steep inclination.



pounds on corrosion of steel laid bare at pores, bents and defects in coatings.

The authors made two basic assumptions: Coatings to be satisfactory for use without lacquering must be anodic to steel, or at least not appreciably cathodic, when tested under conditions simulating those maintained in a can; and coatings not broken in 200 days in corrosive food-stuffs at 100 deg. F. are commercially interesting.

Two thicknesses of tin-nickel alloy coatings were used, approximately 0.00002 and 0.00006 in. thick. They were made by plating steel with equal thicknesses of first nickel, and then tin, and heating. The finishing treatment was at 575 deg. F. for 6 to 8 min. In the middle of the coating there was a diffusion zone of considerable thickness, probably with a composition gradient. The outer fifth of the coating was still pure tin, and likely there was a layer of pure nickel next to the steel.

Tests were run on dried prunes in syrup and sauerkraut, both classed as strongly corrosive food products; on tomatoes as mildly corrosive, on peas, which discolor tinplate, and on spinach, noted for its detinning action. Sauerkraut was selected for the additional reason that nickel plate has been known to stand up longer than tinplate in this food.

Four galvanic couples were run in each of the five foodstuffs. The area of the steel was 1/100 that of the other member of the couple. The tests were continued for total times of 230 to 256 days except for the peas-nickel plate cell, which was stopped after 127 days.

At first the potentials bobbed about a bit in some cases, but they soon settled down to fairly constant values. The potentials of the steel, tinplate and tin-nickel alloy coated steels were close together (0.63 volts). Nickel potentials were consistently about 0.1 volt more noble than the others. Accordingly the open circuit potentials for the couples involving nickel were appreciable (0.08 volts or more) but all the other open circuit potentials were low (0.03 volts or less). It follows that the potentials gave no sure indication of the stripping of the coatings or of the initiation of any pitting. The potentials did show the direction of current flow. Except with spinach, the direction of current flow was consistently favorable to the tin-nickel alloy coatings; that is, the latter tended to protect the bare steel galvanically.



DR. B. D. SAKLATWALLA, Chairman, Alloys Development Corp., Pittsburgh, who delivered the Society's Joseph W. Richards Memorial Lecture.

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In general, the coating was still largely intact in the case of the 0.00006 in. tin-nickel alloy, but seriously impaired in the case of the 0.00002 in. tin-nickel alloy and the tinplate. The 0.00006-in. alloy coating consistently had lower weight loss than the 0.00002 in. alloy coating, which in turn was consistently better than tinplate. The weight losses on tinplate seemed high, particularly in prunes and sauerkraut. The 0.00006

in. alloy coating had a normal corrosion rate about as low as solid nickel, but it did not accelerate the galvanic corrosion of steel the way nickel did. Steel had the highest normal corrosion rate of all the materials.

The corrosion products accumulating in the foods influenced the corrosion rates. In prunes, sauerkraut, and tomatoes the normal corrosion rate of steel was suppressed by the co-presence of tin.

In prunes, most of the steel specimens pitted. The 0.00002 in. alloy coated steel was profusely pitted in all five foods, but the pit depths were shallow (0.003 in. max.). Corrosion at the pits undoubtedly accounted for a large percentage of the weight loss on this material. The 0.00006 in. alloy coated steel was appreciably pitted only in prunes and sauerkraut, but the pits were somewhat deeper than in the case of the thinner alloy coating. Tinplate was pitted in prunes, sauerkraut and tomatoes. On none of the coated materials were the pits deep enough to produce perforations.

As for springers, or hydrogen swells, the 0.00006 in. tin-nickel alloy coating was certainly satisfactory for all the foods tested except possibly sauerkraut. The 0.00002 in. tin-nickel alloy coating would probably be satisfactory in tomatoes, spinach, and prunes. Comparatively, tinplate was worse than either of the alloy coatings, and the thicker alloy coating was better than the thinner.

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Electro galvanizing, Electrolytic Tinning

AT the same session, Ernest H. Lyons, Jr., Meaker Co., Chicago, reported on "The Electro galvanizing of Strip Steel." According to Mr. Lyons, the electro galvanizing-bonderizing-lacquering of steel offers a corrosion-resisting coating which has possibilities, which have often been overlooked. It may well substitute for much more expensive and more critical materials in severely corrosive exposures as in tropic, strong industrial, or chemical atmospheres. The three coatings appear to reinforce each other admirably.

The economies realized by replacing hot dipped with electro galvanized strip depend in part on the lesser amount of zinc required, since the coatings are usually lighter. Where coatings comparable to hot dip coatings have been applied, costs of elec-

trogalvanizing have been somewhat lower if equipment is designed for such coating weights, in spite of the fact that the heavier coatings require additional power as well as the necessary zinc.

Electro galvanized coatings on strip steel are perfectly uniform except at the very edges. The factors governing the ratio of the edge-deposit to the average thickness are: dimensions of the strip; space between the strips during plating; distance from anodes; distance from surface of the solution; polarization and conductivity of the electrolyte. The two outermost strips may receive a heavier coating than inner strips in the plating tank.

It is striking that cyanide zinc baths generally give identical edge effects with those from acid baths, although slight improvement has been

noted in baths with low cathode efficiency which drops off rapidly at high current densities.

Though electrogalvanized coatings on strip steel are not entirely uniform, the non-uniformity is not very significant. On the average strip 6 in. wide, the excess coating carried on the edges is less than 1 per cent of the total weight of zinc. Moreover, along the length of the strip, as well as between the narrow bands along the edges, the coating is perfectly uniform, whereas hot dip coatings may vary as much as 50 per cent and in a quite unpredictable manner.

The comparative resistance to corrosion of electrodeposited and hot dip zinc coatings is still controversial, but it seems clear that, thickness for thickness, electrogalvanizing is at least not inferior to hot galvanizing.

In thirty years, plant capacity for electrogalvanizing strip steel has increased to more than 420,000 amp. Since the electro-coatings withstand forming, may be deposited to any desired thickness, and are much more uniform than hot dip galvanizing, the method will undoubtedly be applied



DR. COLIN G. FINK, Professor of Electro-Chemistry, Columbia University, secretary of the Society.

even more extensively in the future, the author believes.

Two Improved Iron Plating Solutions

R. M. SCHAFFERT and Bruce R. W. Gonser, Battelle Memorial Institute, in a paper entitled "A Sulfate-chloride Solution for Iron Electroplating and Electroforming," described a sulfate-chloride iron electrolyte, having the composition: Ferrous sulfate, 33 oz. per gal.; ferrous chloride, 5.6 oz. per gal.; ammonium chloride, 2.7 oz. per gal., which, although particularly applicable to electrotyping and surfacing of stereotypes, can be used successfully, the authors believe, for the electroforming of such things as molds for die casting, plastic molding and phonograph records, and for stamping dies. The relatively high rate of deposition obtainable with this bath would seem to indicate an advantage over the other iron solutions used for similar purposes. Preliminary tests also indicate that the solution can be used successfully for the building up of worn or undersized machine parts.

The bath remains stable over long periods, and iron deposits produced are less brittle than with either normal sulphate or chloride baths.

Because of the limitations of electrodeposition as applied to electrotyping, the plating solution must be usable in a temperature range of 70 to 115 deg. F.; the metal must be de-

posited in such a manner that no strains are set up in the deposit; the deposited shell must be sufficiently ductile to permit stripping from the mold without breakage; the plating solution must be stable and not too difficult to maintain; the solution must be capable of rapid deposition, and it must produce a smooth deposit, free of pits or roughness.

In making up the bath, it is advisable to reduce the solution with iron filings and acid prior to plating. Ammonium hydroxide should be used to bring the pH up to the proper value. Purification with activated carbon, followed by filtering, is desirable where smooth deposits are essential.

The voltage required depends, of course, upon the current density used and the anode-cathode distance. This distance should be about 4½ to 5 in. Under these conditions, 4 to 6 volts will be required.

Pitting can be practically eliminated by agitation of the bath, but this is objectionable because agitation causes rapid oxidation of the iron solution. However, cathodic agitation, such as obtained by a mechanical device, designed to move the cathode rather slowly in a reciprocating manner, will eliminate pitting satisfac-

torily for most practical purposes without appreciable agitation of the plating solution.

Pitting caused by gas bubble adherence can be reduced appreciably, but not entirely eliminated, by treating the iron bath with activated carbon to remove organic impurities, by occasionally moving the cathode up and down in the bath, by addition of 0.45 cu. in. per gal. of O-cresol sulfonic acid and 0.3 to 0.65 oz. per gal. of Duponal ME, or by using the lowest permissible plating temperature.

The pH of the bath decreases at a rather slow rate under periodic operating and standing conditions, so that occasional additions of ammonium hydroxide are required.

Electrodeposited iron is usually brittle. The deposits obtained with the sulfate-chloride solution were less brittle than those from any of the other 124 baths investigated, but are not ductile enough to withstand appreciable bending. However, deposits up to 0.005 in., reinforced with an equivalent thickness of copper, are ductile enough to withstand curving and finishing operations encountered in electrotyping plants. These deposits can be rendered quite ductile by short period annealing in the range 900 to 1400 deg. F.

William B. Stoddard, Jr., in a report entitled "Iron Plating," described an improved chloride iron plating solution. The addition of small amounts of manganese chloride serves to decrease materially the breaking-in period, the author found.

Specifically, solutions which contain 40 oz. per gal. of pure ferrous chloride containing 65 oz. per gal. of manganese chloride will produce ductile deposits almost immediately. Further, these deposits have a very fine grain size if the proper pH, temperature, and current density are used, and are ductile over a much wider pH and temperature range than if the manganese had not been included. The addition of the manganese serves to decrease the grain size, and to broaden the physical operating conditions considerably.

For prevention of pitting, four wetting agents were tried in the solution, with the following results:

Triton NE is not stable and the deposit becomes more and more brittle as the solution is operated.

Aerosol OT relieves pitting but apparently is not stable in the solution. The cathode deposit takes on a strong odor of an organic acid.

Tergitol 7 acts like a sulfated

higher fatty acid alcohol and is apparently stable in the solution, and does relieve pitting.

Gardinol WA, like the tergitol 7, is apparently perfectly stable in the solution and relieves pitting to a remarkable extent without interfering with the ductility of the iron deposit. This agent forms an insoluble precipitate with ferric iron; consequently material lost in this way should be made up by additions to the solution from time to time.

Alkanol S does not relieve pitting. Apparently it acts very much like the other sulfonated naphthalene compounds.

Successful iron plating requires that the iron plating solutions and the anodes used in them be very pure. It has already been mentioned that formic acid causes gassing at the cathode; and it is supposed that there are numberless other materials that will cause the same effect. For the common metals the following figures seem to be about the top concentrations that can be tolerated:

Copper. 0.006 oz. per gal.

Lead. As little as 0.006 oz. per gal. lead reduces the throwing power of the solution materially. 0.3 oz. per gal. of lead interferes with the deposition of iron to such an extent that only small "islands" of iron are obtained on the cathode, by far the greater area being covered with no visible iron deposit.

Arsenic. Up to about 0.12 oz. per gal. arsenic can be tolerated. However, the addition of arsenic does have a coarsening effect on the structure of the deposit.

Tin. The effect of 0.012 oz. per gal. tin can be detected by a somewhat brighter deposit. However, 0.12 oz. per gal. of tin causes the deposit to become less bright and the high current density areas to become gray.

Zinc. Zinc apparently has little effect on the iron deposit in the pH ranges which we recommend. As much as 1.3 oz. per gal. of zinc metal has been used without any deleterious result.

Molybdenum. 0.13 oz. per gal. sodium molybdate completely stops the deposition of iron.

Nickel. Nickel, in small concentrations, co-deposits with the iron without any difficulty.

Silicon. While using a new glass anode bag it was observed that pitting resulted soon after the bag had been introduced into the solution. The experiment was repeated and it was found that apparently a small amount



DR. L. T. WORK, Director of Research, Metal & Thermit Corp., New York, general chairman of the local committee which arranged the convention.

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of SiO_2 is released into the solution and causes pitting.

Cellulose. It has been noted that solutions have a tendency to pit after having been filtered through filter paper. If cotton anode bags are used, they disintegrate rather rapidly and also seem to cause pitting and embrittlement of the deposit.

Treatment with celite and activated

carbon will in a great many cases soften the deposit by removing the embrittling impurities. Electrolysis of the solution using dummy cathodes also helps.

Suspended material of certain types causes roughness while other types apparently have no effect whatsoever. For example, a solution which has been exposed to the atmosphere for some time will become quite turbid; however, smooth deposits may be obtained from this solution without removing the precipitate. On the other hand, an unbagged anode may cause the solution to yield a rough deposit although the amount of suspended matter is surprisingly small. For this reason we find it profitable to use special bakelite- or resin-treated glass anode bags. These bags seem to be inert in the plating solution and last for a great length of time.

The investigation indicated that an improved iron plating solution has been produced. This solution contains from 26 to 65 oz. per gal. $\text{FeCl}_4 \cdot 4\text{H}_2\text{O}$, plus 0.4 to 0.65 oz. per gal. $\text{MnCl}_4 \cdot 4\text{H}_2\text{O}$, and about 1g./L. gardinol WA powder. The temperature range over which this solution will produce heavy, fine-grained ductile deposits is broad, running from 150 up to 220 deg. F. The pH range is 1.5 to 2.5, with an optimum at about 2.0. In uncontaminated solutions the current efficiency is above 95 per cent. No ventilation is necessary.

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Plating "Novelties", Lead-Indium Corrosion

THE report by Oliver P. Watts, on "Novelties in Electroplating" covered the obtaining of brilliant multicolored electroplates from ammonium molybdate solutions; and a study of the codeposition of nickel and copper which led to the development of a citrate-cyanide bath, with the bright hard alloy deposit containing 60 to 80 per cent nickel, balance copper, depending upon plating conditions which are specified.

The deposits obtained from molybdate solutions were named "rainbow plating" because of the brilliance of the colors and their normally bonded arrangement. The source of these brilliant colors appears to be the same as the colors of the soap-bubble, the reflection of light from two parallel surfaces only half a wave length of light apart. Where the two reflecting surfaces are only half a wave length of red apart, the intensity of that color is strengthened, because the

crests of the red waves reflected from the two surfaces coincide; where the distance between surfaces is less, the blue light will be similarly strengthened, and so for other colors.

The colors in rainbow plating may be made to take the form of an arch, as in nature's rainbow, or they can be distributed irregularly, all by controlling the spacing and position of the anode. The anode consists of a platinum or nickel wire (any other metal insoluble in the electrolyte will serve), which protrudes an inch from the glass tube which insulates it from the plating solution, all except the protruding end. This is coiled closely to confine the entrance of current to a small area, and make possible the control of color and its distribution. For a rainbow form the sheet cathode is placed against one side of the beaker containing the electrolyte, and the anode held against the wall of the

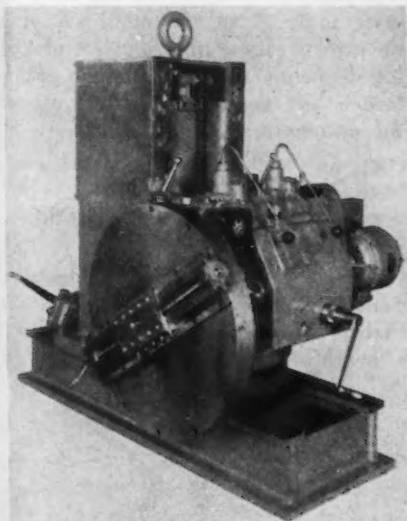
(Continued on page 136D)

New Equipment . . .

Machine Tools

Recent developments in boring and facing machines, special types of grinders and lathes are described in the following pages. Additional machines will be illustrated in a following issue.

GENERAL ENGINEERING & MFG. CO., 1523 South Tenth Street, St. Louis 4, is offering the Gemco boring and facing machine for boring, turning and facing operations on large work pieces such as lathe beds, press frames, bed plates, pipe headers, valves, etc., where the workpieces are too large to be machined



on standard machine tools. The unit is portable and may be taken to the work, but may also be used as a stationary machine. It is mounted on a heavy base on which it may travel by spindle action for 26 in. Automatic or crank operated horizontal travel of spindle housing is 19 in. and crank operated vertical travel 24 in. Seven spindle speeds range from 7 to 100 r.p.m. and four horizontal spindle housing feeds range from 0.009 to 0.063 in. Diameter of face plate is 33 in. Pump operated gravity oiling system lubricates all bearing surfaces and gears. Various optional features are available.

Centering Machine

TO center bars quickly, easily and accurately, the **Whitcomb Mfg. Co.**, 476 Eighth Street, Troy, N. Y., has placed on the market the "Quick-

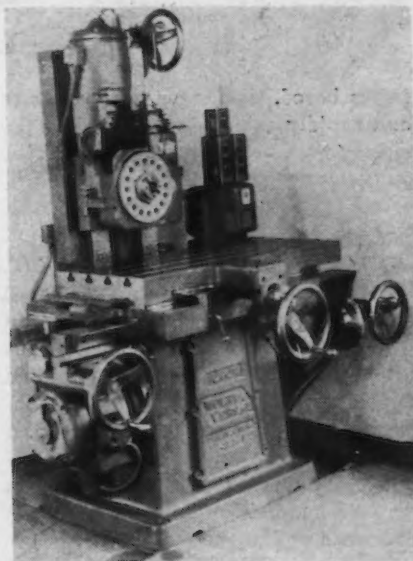
center," pictured. The work is placed on the V-block and a handwheel turned until the work is held securely between a rising V-block and a lowering button. When tight, the work is in line with the center line of the spindle and the hand lever advances the center drill to the work. It is equipped with a ¼-hp. motor and has speeds of 700, 1300 and 2300 r.p.m. adjusted by a 3-step V-belt sheeve. It will center round bars from ½ to 3 in. in diameter within 0.005 in.



Combination Machine

A NEW No. 10 Multi-Versal machine which lends itself especially to machining complicated shapes and angles has been announced by the **Hack Machine Co.**, Des Plaines, Ill. Designed to perform a sequence of operations without disturbing the part, the unit has five new features added to the 30 operations regularly performed on preceding models, and weighs approximately 1000 lb. more. Jig boring, vertical and horizontal milling, angular and vertical slotting, filing, drill-

ing, grinding, broaching, jig sawing, cutting, lapping, honing, form tool planing, key seating, graduation, rack shaping, template cutting, die sinking by routing or engraving, duplicating of 14 x 18 in. area and contour milling can be performed. The five new operations are spiral milling, gear hobbing, universal boring bar



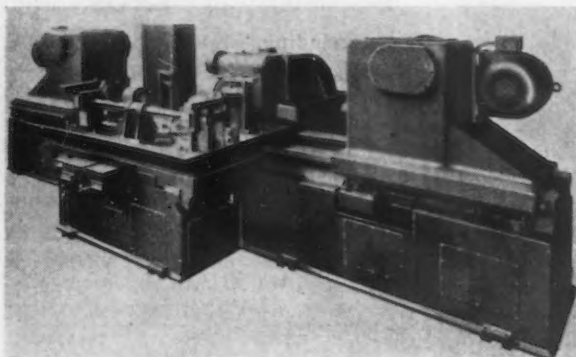
work, form tool generating and internal and external thread milling. Longitudinal travel is 36 in., with traverse travel 14 in. Ram stroke is 4¼ in., while milling capacity is ¾ in. diameter end mill to 8 in. face mill. The head is a high speed unit (5000 r.p.m.) with micrometer adjustment, coupled to a vertical head.

Special Boring Machine

A SPECIAL hydraulic 3-way boring machine, designed to bore and counterbore 12 holes in a cast steel differential and final drive housing, has been developed by **LeMaire Tool & Mfg. Co.**, Dearborn, Mich. The 7-ft. long part, weighing approximately 1200 lb., can be loaded and bored and back on the floor within 30 min. The machine consists of a center head, with one spindle carrying a

NEW EQUIPMENT

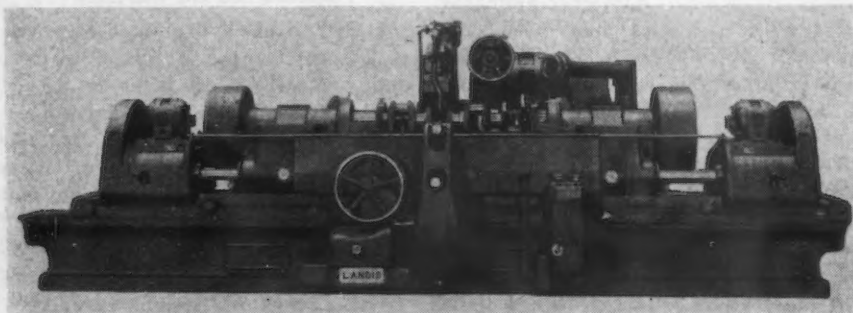
10½ in. cutter on each side, and two end heads, each carrying two spindles, one having three cutters and the other two. The machine is designed to bore and counterbore five holes in each end ranging from 5.118 to 7.125 in. in diameter, while the center head bores two main bearings 10.501 in. in diameter and also sweeps the shoulder bearing seat. All holes are held within 0.0012 tolerance. Both end heads feed while the center head bores one large bearing. When one large bear-



ing is bored, the center head reverses and rapidly advances to a feeding position to bore the large bearing on the opposite side.

Crank Pin Grinder

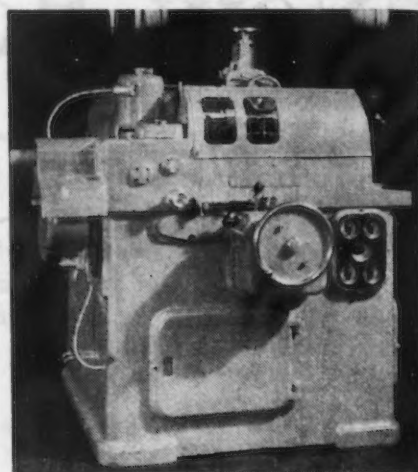
THE LANDIS TOOL CO., Waynesboro, Pa., has developed a 25 in. Type DD hydraulic crank pin grinder, which in the shorter lengths is applicable to both single and double throw radial engine crankshafts and for in-line liquid cooled aircraft engine crankshafts. Numerous of the smaller diesel engine shafts may be handled by the longer length machines. The dual work drive arrangement eliminates or minimizes objectional axial deflection in the crankshaft. The speed of the two work drive motors is synchronized electrically. Both work heads may be moved transversely on the top of the work table by means of rack and pinion arrangements, permitting shafts of varying lengths to be handled by the same machine. The work heads are of extra heavy design.



Two balancing weights, which may be moved radially in a T-slot, are mounted on a circular plate attached to the outer end of each work spindle. Fixture alining latches hold the two work fixtures in alignment during unloading and loading. A shoulder grinding attachment is controlled by a handwheel close to the feed-up handwheel. Graduations in "tenths" enable accurate gaging of the extent to which the wheel is feeding sidewise. A grouping of three controls at the front of the machine permits ready control of the direction of the feed and adjustment of the speed of both the fast and slow feeding movements. A 48-in. diameter grinding wheel is standard. The Type DD is available in four sizes—25 x 48, 25 x 80, 25 x 96 and 25 x 120 in.

Thread Grinder

THE SHEFFIELD CORP., Dayton 1, is now offering a thread grinder on which either a conventional single-ribbed wheel or a multi-ribbed wheel may be employed. The unit produces single or multiple right or left-hand threads with any pitch up to 60 threads per in. Maximum length of work held between centers is 12 in. and maximum thread length ground is 8 in. It will accommodate work of a maximum diameter of 7 in. and will grind any type of thread to a maximum diameter of 3 in. Either traverse grinding or plunge cutting may be employed. In the latter operation a multi-ribbed wheel sufficiently wide to equal thread length is fed in to the full depth of the thread, and the threaded increment is formed in one pass with the stock making 1 1/3 to 1½ turns. Two, three or four start threads may be ground in one pass, thus eliminating the necessity for precision indexing and additional grinding opera-



tions for the second, third and fourth starts. An important feature is the multi-ribbed wheel dresser which is forced into the slowly rotating wheel to accurately form the wheel ribs. Another is an oil pressure switch, which prevents the wheel motor from starting until the oil pump has built up pressure to a predetermined point for continuous operation. Certain models of the grinder are equipped for automatic cycle grinding.

Cut-off Machine

THE 47 P Abrasaw, placed on the market by the **Bridgeport Safety Emery Wheel Co.**, Bridgeport, Conn., has the base made of a single casting instead of being mounted on a pedestal as in former models. A



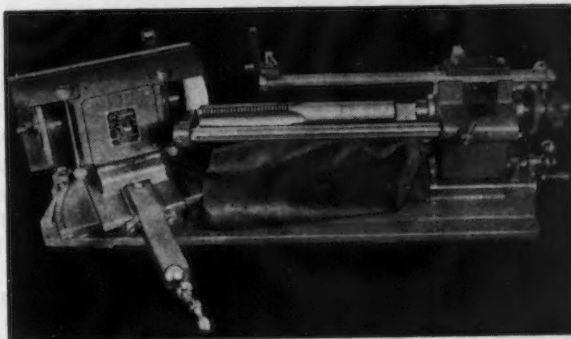
large coolant tank is located in the base, with the coolant pump mounted on the rear of the machine. Auto-

NEW EQUIPMENT

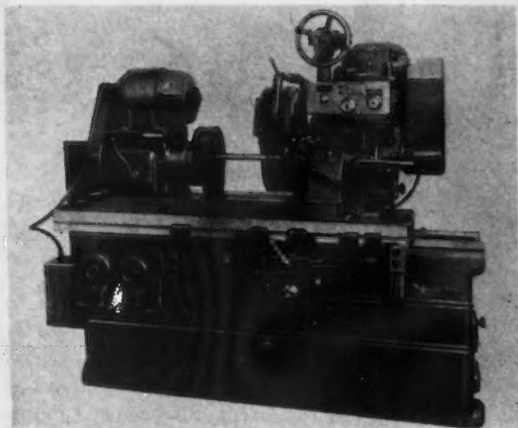
matic coolant control is regular equipment, but hand control can be supplied. Vises can be furnished for straight cuts only or in combination straight and angle type.

Cylindrical Grinders

PUT on the market by the *Fitchburg Grinding Machine Corp.*, Fitchburg, Mass., the 10 in. Type B plain cylindrical grinder illustrated is equipped with a fixed standard Bow-



mounted in a quill so it can be easily renewed or removed for inspection. It has three speeds and is driven by a $\frac{3}{4}$ -hp. motor which is mounted above and to the back of the grinding operation. All controls are in easy reach of the operator and operate freely.



gage wheelhead unit. The Bowgage head goes through a completely automatic cycle all started by one push button. Feed movements may be controlled in 0.0001 in. on the wheel feed dial. Individual motor drives for the Bowgage wheelhead unit, table traverse, work spindle and coolant pump are provided, with belt tension adjustments readily accessible. The truing device is mounted on the footstock and, after being set by hand, is operated by the work table traversing the diamond across the face of the wheel. The company has also developed a 6 in. Type B for handling both small lots of parts or continuous repetitive work. It does not require a special foundation and may be moved from one department to another. The wheel spindle runs in special lead bronze bearings, adjustable for wear. Wheelhead and table run on large V and flat ways. The bowed spring method of wheel feed gives a vertical to horizontal ratio of approximately 250 to 1, enabling accuracy to 0.0001 in. The automatic cross feed is a continuous infeed which may be used for plunge cut grinding or table traverse work. Stepless grinding feed rates from 0 to 0.063 in. are available by hand-wheel control.

Tap Grinder

THE No. 2 tap grinder for sharpening the chamfer on taps from No. 0 to 2 in. and up to 14 in. long

has been announced by *Edward Blake Co.*, 634 Commonwealth Avenue, Newton Center, Mass. It is similar in construction to the No. 1 tap grinder except that the bed casting is longer to accommodate longer taps. The segment under the wheel head slide is wide enough to allow the head to be swiveled for chamber angle, either in the conventional manner or around to the back of the work. The unit is provided with change

gears for sharpening 2, 3, 4, 5, 6, 8 or 10 flutes, right or left hand. Taps can be held in Blake bushings for rapid operation or in collets or between centers.

Cutter and Tool Grinder

THE No. 12 universal cutter and tool grinder has been constructed by the *Covel Mfg. Co.*, Benton Harbor, Mich., for manufacturing and reconditioning milling cutters, reamers, boring bars, etc. The table and saddle are mounted on ball bearings supported by hardened and ground slides. The main spindle is



Carbide Tool Grinder

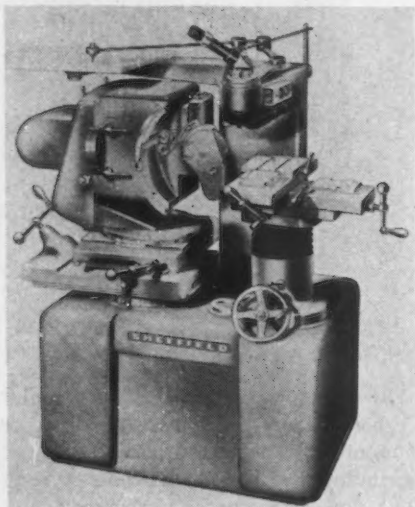
THOMAS PROSSER & SON, 120 Wall Street, New York, announce an improved heavy duty carbide tool grinder, the Model EE, which can be supplied for wet or dry grinding. The spindle runs in double row, self-aligning, precision ball bearings with labyrinth dust seal, and is mounted in a heavy one-piece yoke.



The drive is by means of double V-belts from the motor, which is mounted on a hinged base. The wet grinding equipment provides a copious flow of water and permits faster grinding without checking or cracking the carbide tips. The equipment consists of a coolant pump, pan, settling tank, piping and nozzles. The nozzles are so arranged that the flow of coolant can be directed on the tool regardless of which side of either wheel is being used. Either diamond or silicon carbide cup wheels can be used on either end for the grinding of carbide tools, or aluminum oxide roughing or finishing wheels for grinding high speed steel, Stellite, etc., so that any combination of wheels desired can be used. Various attachments can be furnished, such as a drill grinding attachment or diamond wheel dresser.

Profile Grinder

ON the Micro-Form grinder introduced by the *Sheffield Corp.*, Dayton 1, use of a 50 times size layout, a pantograph system, microscopic inspection and a universal grinder are coordinated to produce profile grinding to an accuracy within ± 0.0003 in. It is now being used to grind flat and circular form tools, punches and die segments, profile gages, special cams, templates and many other irregular parts from a wide variety of materials, including tungsten carbide. A layout drawing made to a scale of 50 to 1 is placed on the drawing table of the pantograph which has a microscope mounted on a short arm. Following the lines of the layout drawing from point to point with the pantograph stylus moves the microscope equipped with crosshairs exactly according to the profile to be ground. The operator feeds the grinding wheel so that its cutting edge always works toward the point marked by the crosshairs which corresponds to the position of the stylus. The grinding wheel can be set at a desired angle to move in



any direction by means of the unusual arrangement of cross and circular slides and other adjustments which give the effect of a double universal joint.

Abrasive Belt Grinder

AN improved 6 in. Wet-N-Dry abrasive belt grinder has been placed on the market by *Hammond Machinery Builders, Inc.*, 1612 Douglas Avenue, Kalamazoo, Mich. The machine can be adjusted from vertical to horizontal position while running. The belt tension and tracking device can likewise be quickly adjusted by means of two conveniently

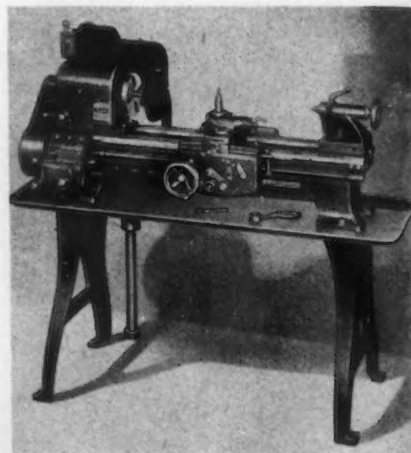
located handles. The unit is totally enclosed and is arranged for an individual dust collector or for connection to an exhaust system. The cast iron belt pulleys are dynamically balanced. The work table can be adjusted to any desired working angle and is available as a bench or floor model. Equipped with tank and



pump unit, the machine can also be equipped for water-main connection only. Both models are furnished with damper or spray control and two nozzles for uniform spraying. Should dry operation be desired, an air exhaust system can be attached. Vacuum cup drive pulleys eliminating belt slippage are furnished on wet machines only.

Quick Change Gear Lathe

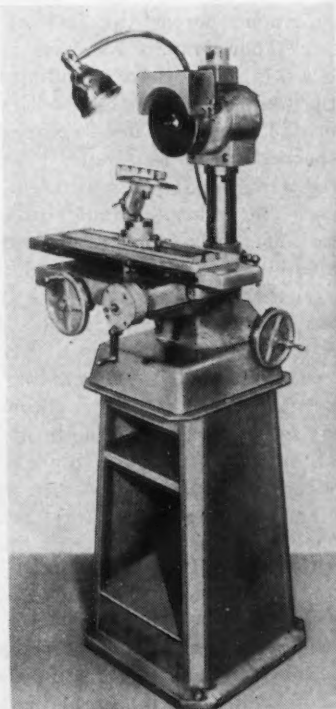
THE quick change gear lathe put on the market by the *Logan Engineering Co.*, 4901 Lawrence Avenue, Chicago, is said to be of special value where frequent changes in operating feeds must be made. The gear box provides 48 threads and feeds in either direction to the carriage. Screw threads from 8 to 224 per in. are available, and by changing the 24-tooth stud gear for a 48-tooth stud gear, additional threads from 4 to 7 per in. are available. Longitudinal power feeds from 0.0015 to 0.1000 in. per rev. on the spindle may be obtained. Power cross feeds are 0.25 times the longitudinal feeds. An automatic apron operates from a



spline in the lead screw through a worm drive and friction clutch for both longitudinal and cross feeds. Half nuts are used for cutting threads. Swing over bed is $10\frac{1}{2}$ in. Distance between centers is 24 in.

Carbide Chip Breaker Grinder

THE carbide tool chip breaker grinder offered by *Carboloy Co., Inc.*, Detroit 32, is designed for grinding of chip breakers in single point tools and roller turner tools, and can be adapted to use for grinding flat form tools and round or square boring bits. The long table with 10% in. of travel makes possible the grinding of breaker grooves in both right and left-hand tools without moving the universal fixture on the table. Designed for the use of 6-in. wheels, the head is vertically adjustable from either side of the machine. A universal fixture and vise holds tools up



to 1½ in. wide, and is designed to tip 90 deg. either side of horizontal. The center of the fixture can be cross-fed 1 in. past the center of the wheel. The traverse mechanism can be changed from direct drive to slow speed through a 5:1 reduction ratio.

Lathe Collet Chuck

THE double end construction of the speed lathe with collet chuck manufactured by the *Standard Electrical Tool Co.*, 2489 River Road, Cincinnati, permits two operators to work at the same time. A combination clutch and brake permits either

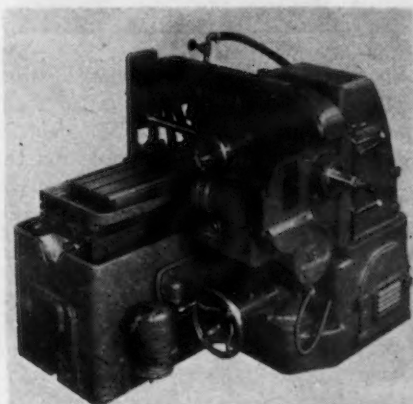
parts as multi-jaw clutches, spline shafts and other types of repetition manufacture. Among the features are the gate type front overarm brace and slip-on type splined pick-off gears located at rear end of spindle housing, permitting quick change of spindle speeds. The arrangement of the trip dogs and hydraulic infinite variable feed mechanism makes possible a completely automatic cycle. The spindle rotation



side of the machine to be controlled independently. The 1-hp. motor is individually controlled by a toggle switch. The right hand side of machine illustrated is equipped with Sjogren collet chuck, while the left hand side is furnished with a 4-in. universal lathe chuck. Available also as a single end machine in sizes of ½, 1 and 2 hp., with spindle speeds from 50 to 3450 r.p.m., it can be furnished in a bench model with foot pedal control.

Manufacturing Milling Machine

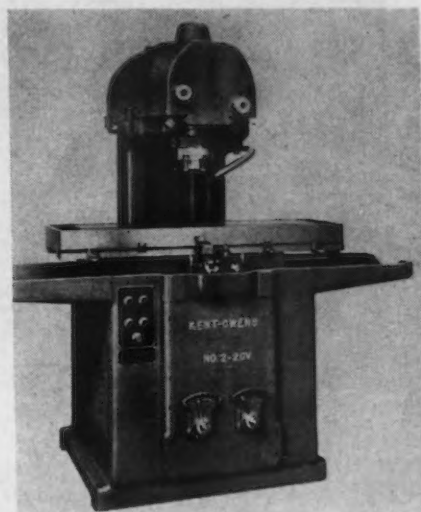
MODERN TOOL WORKS LTD., 69 Montcalm Avenue, Toronto, has brought out the Hydraulpro, a manufacturing milling machine, in two sizes, the 14-36 and 14-60, designating tables 14 in. wide and 36 or 60 in. long. The automatic intermittent feed cycle are designed specifically for continuous manufacturing of such parts as exhaust intake manifolds, cylinder blocks, etc., and for multiple gang milling of such



may be interlocked and synchronized with table movements. Three motors are used — a 3-hp. inbuilt motor drives the spindle head, a 3-hp. motor in base is connected to tandem hydraulic pump, and a ¼-hp. motor is connected to impeller type coolant pump.

Vertical Miller

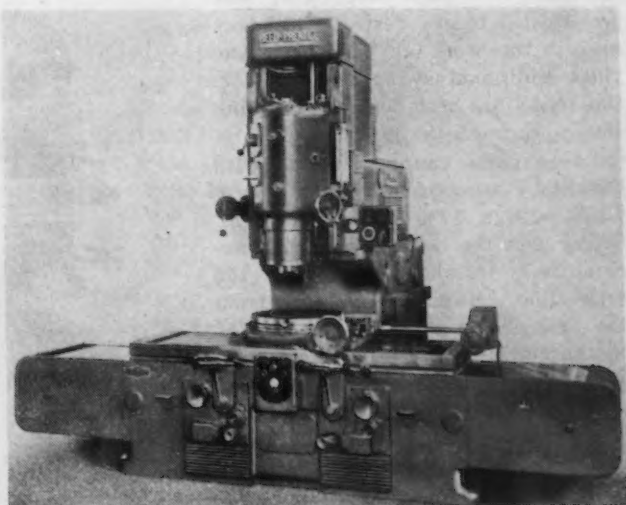
THE Model 2-20V vertical miller has been added to the line of *Kent Owens Machine Co.*, Toledo. The 42x12 in. deep-section table travels 20 in. in ways directly in the bed and can be automatically shifted from rapid traverse to feed in either direction, and automatically reversed at both ends of the stroke. Three different column heights are available. The base machine has a maximum gap of 10 in., with maximum gaps of 12 or 14 in. also available, each having 4 in. vertical quill adjustment. Wide face spline mounted pick-off gears provide a range of spindle speeds from 64 to 80 r.p.m. independent adjustment

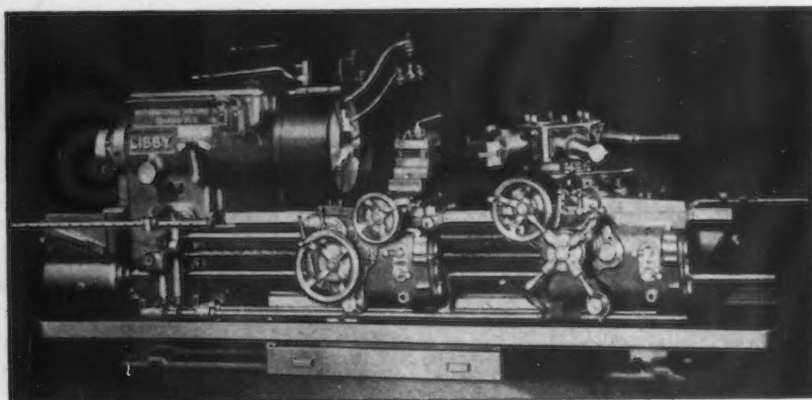


of the feed rate for opposite directions of table travel is provided, making possible different operations at each end of the machine.

Miller with Electronic Control

POWER down feed for either drilling or boring is controlled by electronic speed and torque regulator on the improved No. 4 vertical miller put on the market by *Reed-Prentice Corp.*, Worcester, Mass. The compact electronic unit is mounted on top of the cross slide, and controls a 1½ hp. d.c. motor, providing smooth, infinitely variable feed power to the vertical head. The unit operates on 50 or 60 cycle, single phase in the range between 200 and 600 volts, with an inherent safety factor providing a natural increase or decrease in motor speed to the selected feed rate. The circuit is self-braking. Overload protection is supplied for the feed drive in event of stalling or jamming. The rest of the machine is standard, including hydraulic longitudinal table feed and cross feed of the head.





Heavy Duty Turret Lathes

THE Type H heavy duty turret lathe offered by the *International Machine Tool Corp., Libby Div.*, Indianapolis, is made in five standard sizes, and in addition five standard sizes of the fixed gap lathes and three sliding gap types are available. The Libby Model H lathe has a 24 in. swing over the ways and is furnished in either a 5¼ or 6¼ in. spindle bore. The turning length capacity is 56 in. from the face of the chuck to the face of the turret. Swing over the ways of the 2H model is 27 in. and it is furnished with an 8 or 10 in. spindle bore. Model 3H has a 29 in. swing over the ways, with 8, 10 or 12 in. spindle bore. The same spindle bore is furnished for the 4H model, which has a 32 in. swing. The Model 5H is furnished in 2¼, 10¼ and 12¼ in. spindle bore, and has a 36 in. swing. The turning length on the standard 2H, 3H, 4H and 5H models is 6 ft., with extra bed lengths available.

Type H fixed gap turret lathe is furnished with fixed gaps 26 to 56 in. long in 6-in. increments. The 3H machine is designed to swing 42 in. diameter, the 4H swings 45½ in. and the 5H 49 in. diameter. The Type H sliding bed gap turret lathe may be adjusted to any desired width gap to suit the work at hand and provides additional swing up to 84 in. One model has been designed to swing 150 in. through the gap.

Large parts can be handled with the Libby special heavy-duty turret lathe with a 17¼ in. spindle bore. Swing over the bed ways of this machine is 41 in. and 37½ in. over the cross-slide. Maximum distance from the face of the chuck to the face of the turret is 12 ft. Like the 150-in. swing gap lathe, this machine is also powered by a 40-hp. motor.

Eight spindle speeds are available in the headstock transmission of the Type H machine. Sixteen spindle

speeds are obtainable with a two-speed motor. Eight reversible feeds are provided in the apron for each of the nine positions of the lever on the selective gear box, providing 72 feeds in all for cutting all standard threads. Cross feed operates through a friction clutch. Adjustable stops are provided for automatically disengaging the feed for duplicating dimensions. Power rapid traverse for longitudinal movement of the carriage in either direction is obtained by rotating the leadscrew in the apron nut. The leadscrew permits the use of taps, dieheads, multiple thread chasers or single point tools. An indicator dial is provided for threading blind holes.

Bench Miller

AVERTICAL bench milling machine with a quick-change attachment for horizontal milling is announced by *Benchmaster Tool Co.*, 2952 West Pico, Los Angeles. The 2½ in. diameter arm supporting the spindle head can be adjusted to rotate the spindle 60 deg. either side of center, or the entire head may be replaced with an enclosed horizontal milling attachment. The 6x14 in.

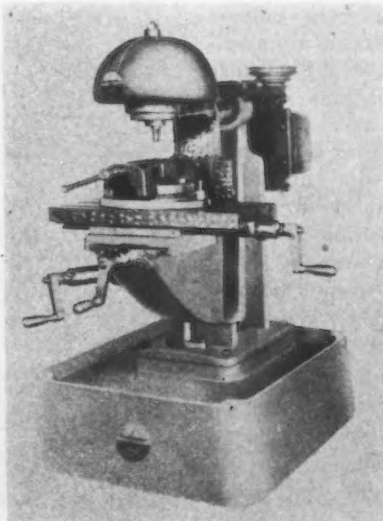
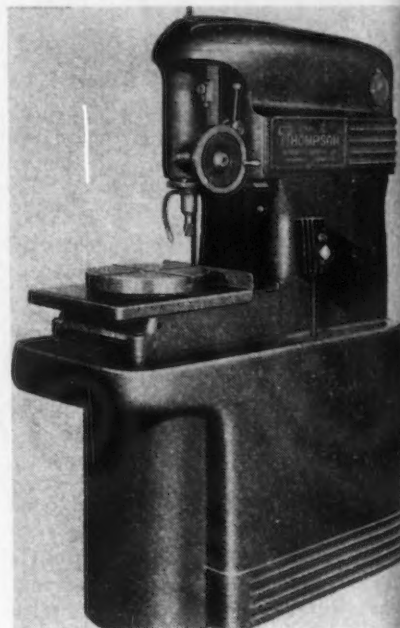


table has three T-slots. Micrometer adjustments are operated by convenient splined disengageable hand cranks, with graduated dials reading in thousandths of an inch. Proper tension on the V-belt is assured by a floating motor mount, permitting rapid changes of the four spindle speeds of 450, 850, 1400 and 2100 r.p.m. The spindle has a No. 2 Morse taper.

Profile Miller

THE Earl A. Thompson Mfg. Co., 1300 Hilton Road, Ferndale, Mich., has developed a simple, inexpensive automatic profile miller for mass production of irregularly contoured parts. Load and unload time is cut to a minimum, requiring no machine stoppage. The head of the machine carries the cutter spindle,



mounted on precision Timken bearings within the quill. The quill has a silent chain drive, hardened, helical change gears, and a 6-in. vertical adjustment. The head is adjustable to 0.001 in. Spindle and table are independently driven and controlled, with spindle speed range from 127 to 3435 r.p.m. Work is carried on a 14-in. rotating table, hydraulically controlled by a cam and follower mechanism. Two easily adjusted program disks determine rapid indexing cycles and automatic table stop. Other features are: Complete automatic hydraulic control of feed and rapid traverse, spindle quill lock, spindle drive clutch, brake and work table stop. A pressure and gravity lubrication system is built into the machine.

the "Madman"



Engraved by H. Fernell.

THIS man had a vision. He saw a world in which men would fly through space, and voices could be heard thousands of miles away. A world in which buildings would be many houses high, lighted without lamps, and ascended without recourse to stairs. A world in which machines would do most of the work. . . . And he saw all this made possible as a result of water being heated in a closed container. Standing at the threshold of the age of steam, he had a vision of the future.

Now this man lived in a sane and sensible world, so they beat him with brooms and pelted him with pots, and his final reward for this demented woolgathering was one of the less sanitary cells in Bedlam.

We haven't yet reached the millennium, of course. But we've learned the value of vision. We've learned that it is a divine sort of madness, to be searched for rather than hunted, to be used rather than destroyed.

Today, we're on the threshold of a new age of power — the new Age of Air Transportation — and a handful of visionary men are already telling us what they see in the future beyond this war.

A vision? Yes, but no pipe dream, for the day of world air transport is already in the planning stage.

We in the field of machine tool engineering have had a hand in bringing about the vision of this new age. We helped to make possible the "impossible" mass production of aircraft and engines through an entirely new assembly line technique, known as "fluid production." And today, we're already at work on production plans for the future.

There is no tool that we cannot build, no job that we cannot do, given the necessity. . . . War was a necessity. So, too, will be peace. . . . We invite you to call upon us now, as the leaders of American industry have been doing for more than a century.

Universal Turret Lathes . Fay Automatic Lathes . Automatic Thread Grinders . Optical Comparators . Automatic Opening Threading Dies



JONES & LAMSON

MACHINE CO., SPRINGFIELD, VERMONT, U.S.A.
Profit-producing Machine Tools

Assembly Line . . .

STANLEY H. BRAMS

• New plastics are shown in Detroit exposition . . . Laminated and impregnated wood may be increasingly important steel competitor . . . Hypothetical all-plastic refrigerator engineered at round table session.



DETROIT—The much publicized world of plastics rooted itself for one mid-October day in the greatest steel-consuming center of the country, when extremely large displays of the products of plastic material manufacturers, molders, machine tool builders, mold builders, and others were shown in the main exhibition room of the Engineering Society of Detroit. Indicative of the general interest was the fact that a number of steel men were noted in the crowd examining the several thousand exhibits.

Their general viewpoint was that plastics, at least the segment of plastics on display at the Rakcham Bldg., did not constitute any great threat to the steel industry except in scattered, smaller applications. They pointed out that the fact remains that tensile strength, scratch and surface hardness, and other physical attributes of plastics do not come close to comparing with steel. At the same time, there is admission on all sides that plastics prices in the main are considerably higher than for steel.

Perhaps a more significant part of the show was staged in a round table discussion which occupied the latter share of the afternoon, and was attended practically exclusively by plastics men. This discussion dealt with the engineering and development work on a hypothetical product, in this

case, a refrigerator, and the material chosen for use was laminated resin-impregnated wood, rather than thermoplastics or thermosetting plastics.

It is no particular secret in the steel trade that many industry analysts have figured that widened use of wood in thin laminations might pose a greater competitive problem for them, particularly in the automotive industry, than more orthodox plastics. Confirming this viewpoint, the round table participants acting as an "engineering" board in this hypothetical production problem immediately took the stand that the structure of the refrigerator they would make of all plastics would have to be produced either out of wood laminations or of paper base plastic; wood was finally approved by the majority. Made of such materials, the refrigerator developed was expected to be almost as strong as an orthodox refrigerator of steel, and in any case strong enough; and it would weigh only one-third to one-half as much.

The board members decided that they could build practically the entire box out of plastics with the exception of the shelves, which in such large transparencies would carry prohibitive price tags. There was belief that the ice cube trays might be made out of plastic rather than metal despite the stresses laid on those parts; an exhibit of a tray in the display room below tended to support this viewpoint.

It may have been more than coincidental that a refrigerator was chosen as the subject matter of the experimental "engineering session." Trade reports are that one major refrigerator company has been quietly experimenting with plastics, presumably wood laminations, as a material for a post-war refrigerator offering.

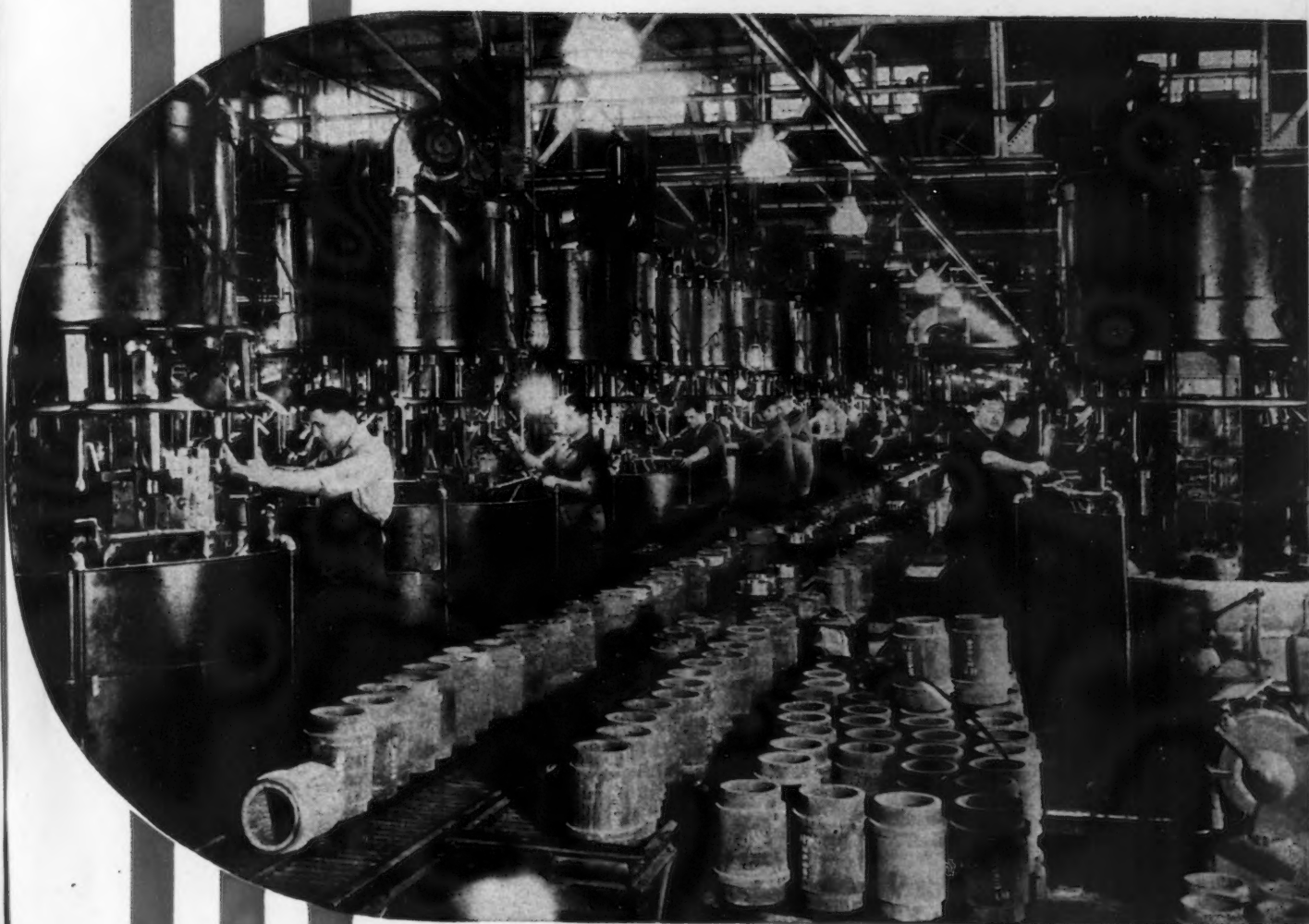
USE of plywood for refrigerators and for other uses requiring resistance to water and moisture appears possible with new developments of the industry. This feeling was advanced in a paper by Thomas D. Perry, of the Resinous Products and Chemical Co. Resins now available for airplane assembly purposes, he said, are significantly water resistant; test samples after three months of continuous soaking still retain over half their shear strength. These resins were said to be far less damaging to edge tools than casein bonds.

Application for plywood in war industries goes well beyond the aircraft program, which includes manufacture of sections for fuselage and wing structures on trainers, gliders, cargo and small fighter planes. Plywood hulls are also being used in small boats, and for decks and housings in larger vessels. The engineer and quartermaster corps are using plywood ramps and pontoons for temporary bridges, in protective screens for camouflage, for barracks and quarters, and for chests, lockers, cabinets, furniture and equipment. Mr. Perry closed his paper with these remarks: "A candid appraisal of the situation indicates the definite adoption of plywood where strength-to-weight factors and workability are dominant, of the metals where extreme strength is needed, of fabrics and of molded plastics where these materials may be found adequate. By and large, this combination of various types and materials keeps clear differentiation between them, using each where it is best adapted to the immediate purpose. While the earlier attention to plywood, some two years ago, was largely because of its availability in the face of the scarcity of metals, it has now come to have wide recognition on its own merits."

On this store, the first publicized plywood automobile body was made in Detroit about a year ago as an experimental job by a design engineer. A flickering of interest was evinced by the auto companies, but no more than that. Perhaps they had work of a similar nature in their own minds and research shops and needed no ideas from outside; perhaps it simply did not seem practical at the time.

Henry Ford is the only one of the auto makers to make available any public show of developments. A few years ago, he demonstrated one of the most famous sledge hammerings in history, when he swung a mallet on the plastic rear deck of an experimental Ford automobile. The rear deck held intact under the blow, even though some jocular comment has recently been heard to the effect that if Mr. Ford had tried the same stunt in either warmer or colder weather he might well have shattered the entire section. But since that time, Ford Motor Co. has, at least for the war period, turned its back on plastic developments, and the company's best known exponent of the plastic art,

Battery of Type "D" Mult-Au-Matics in a large airplane engine plant, machining cylinder barrels.



PRODUCTION *"Line of Battle"*

Two urgent demands, from this all-out war, have brought into being many batteries of Bullard Mult-Au-Matics like the one shown here: The demand for production in overwhelming volume. And, no less important, the demand for the uncompromising accuracy which gives to airplane engines their fighting edge.

Since Mult-Au-Matic production is continuous production . . . since accuracy that meets fine-tolerance standards is built into its sturdy construction . . . and since the Mult-Au-Matic delivers both these essentials at marked savings of man-power and floorspace, the Mult-Au-Matic is the natural choice for scores of urgent war jobs.

* * * * *

And when peace is won — a little time for retooling, and they'll contribute this same volume-with-precision to important new tasks.

THE BULLARD COMPANY
BRIDGEPORT 2, CONNECTICUT

Robert A. Boyer, has moved to a new job as director of scientific research for the Drackett Co. in Cincinnati. At the same time, considerable of the laboratory and pilot plant equipment he developed was sold by Ford to Drackett.

Plastics may prove to have more application in manufacturing spheres where the strength factors are not so great as those required in automobiles and trucks. This might point to wider use of the laboratory materials in electrical appliances than in vehicles.

NOT as much attention has been given to the size of the post-war appliance market as has been devoted to the huge automobile requirements now developing. But the fields will be equally mammoth on a unit basis. Some indication of electrical appliance boundaries has come from Norge Div. of Borg-Warner Corp., which recently completed an initial survey of marketing opinion in the minds of its distributors and dealers. Reports from 495 of the larger dealers showed an average of twenty-five calls weekly for new washers, and eighteen calls weekly for used washers. Although the pre-war market was close to the saturation point in the washing machine field, exceptionally large pent-up demand has developed there, these figures indicate.

Another major appliance manufacturer, studying the potential for refrigerators, figures that if the war lasts until 1945 there will be a then-existing demand for 7,000,000 units, plus a million more prospects for trade-ins. This compares with a normal pre-war market of around 3,000,000 units annually.

On the general subject of substitutes for steel, note may be made that Willys-Overland Motors, Inc., is now producing one-ton trailers for military vehicles, with bodies made of a composite wood material designed to conserve steel. The vehicles are being mass manufactured on the same assembly lines used to manufacture quarter-ton amphibian trailers for the company's jeeps.

Unlike the smaller cargo carriers, the new trailers can be attached to any size truck and are equipped with wheels and tires that are interchangeable with those of standard military vehicles. Other features of the conveyance include a third wheel under the pintle hook, removable side racks and roof bows for a tarpaulin covering. The body of the trailer has a floor space of nearly 30 sq. ft. and a height of 40 in.

Bottlenecks in Steel Expansion Plan Seen Broken in Two Months

Detroit

• • • Pressure for heavy pieces of equipment required for the steel expansion program is gradually being relieved, and within the next 60 days the bottleneck should be broken, the Detroit district section of the Association of Iron and Steel Engineers was told at its October meeting by Julius A. Clauss, chief of the Plant Facilities Branch of the WPB Steel Division. Mr. Clauss took the opportunity in appearing before the section he helped establish to provide an up-to-date summary of the entire expansion program.

The progress described by Mr. Clauss was illustrated in a series of charts and slides analyzed by James A. Rowan of the WPB Steel Division, who is on leave from THE IRON AGE.

The expansion program, covering all facilities required for mining of ore, transportation, conversion to pig iron, steel and finished products, involves an expenditure of \$1,250,000,000 said Mr. Clauss. By the end of the year this is expected to provide over 90,000,000 tons of steel making capacity.

Mr. Clauss discussed the specific sections of the general expansion program as follows:

Ore Mining Projects: Since 1942, 21 different projects have been undertaken, to contribute more than 13,000,000 net tons of ore to existing capacity when completed.

Coke: By next January capacity

will be 57,250,000 tons of coke, against 51,000,000 in January of this year and 50,000,000 in January, 1942, an increase provided by rehabilitation of existing plants and building of 16 coke oven plants with necessary by-product coal and coke handling equipment.

Sintering Plants: Next January's capacity for sintering will be 26,500,000 tons, against 18,000,000 tons last January and 16,250,000 in January, 1942, provided by 22 sintering plants built or in construction.

Pig Iron: Productive capacity next January will be 70,000,000 tons, against 62,000,000 tons last January and 59,750,000 in January, 1942, made possible by rehabilitation and enlarging of many blast furnaces as well as building of 22 new ones.

Open Hearth Steel: Next January, open hearth capacity will be 84,250,000 tons, against 79,000,000 tons last January and 74,500,000 tons in January, 1941. This increase was brought about by construction of 12 major projects, consisting of new furnaces, as well as enlargement of existing facilities.

Electric Steel: By the end of this year electric furnace capacity will be approximately 6,500,000 tons, against 4,500,000 tons in January of this year, and 2,500,000 tons in January, 1941, the increases arising from construction of 17 major projects, most of them already operating.

139,000 Hours Lost by Budd Plants in Wildcat Strikes

Detroit

• • • Approximately 139,000 man hours of work have been lost at the Budd Wheel Co., and the Edward B. Budd Manufacturing Co. here through a series of wildcat strikes which began last May 27 and continued into September.

These figures were brought out at a special War Labor Board panel hearing charges against 14 Budd union shop stewards and committeemen, charged by the companies with insubordination, spreading of confusion, disrupting and resorting to violence in the latest Budd strikes during September.

Tool List Curtailed

New York

• • • All regional Critical Tool Services received notice on Oct. 9 discontinuing the active maintenance of the available hours list for critical machine tools which has been published regularly for about two years.

The local Critical Tools Service reports that certain specific types of operation are still extremely critical from time to time. To meet this demand, the service will continue to function in locating needed machine tool capacity for firms having work for subcontracting.

A comprehensive series of questions and answers covering the redistribution of machine tools will be found in this issue starting on page 110.

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—TO ADJUST
—TO OPERATE

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PIPE TAPS



NON-ROTATING TYPE



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For tapping steel products, you need **MURCHEY'S Full Receding Pipe Taps**. These Collapsible Pipe Taps are the result of Murchey's years of experience in developing equipment for all types of threading operations. Production men everywhere recognize MURCHEY'S as the foremost products of their kind for simplicity, speed of operation, accuracy and ability to lower production costs.

MURCHEY MACHINE & TOOL CO.
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MURCHEY

• **Battle between industry and government comes into the open in contract termination hearings . . . Forrestal and Patterson claim unless their plan is used business will face post-war economic chaos . . . General Accounting Office seeks jurisdiction to review settlements.**



WASHINGTON — Smoldering for a year, the hottest and most important battle government and industry have waged broke into the open this week in hearings held before the House Military Affairs Committee and the Senate Small Business Committee. National policy to govern contract cancellation is the issue.

The fight is so big that it involves every major department of the government with an interest in war procurement and every business and labor interest represented in Washington. The Senate Truman Commit-

Patterson and Warren testimony will be found on pages 88 and 89 in this issue.

tee, the Senate Military Affairs Committee and the House Naval Affairs Committee plan to take a hand in the decision.

Undersecretary of War Robert P. Patterson and Undersecretary of the Navy James V. Forrestal who have the support of the Committee for Economic Development, WPB and the Maritime Commission, assert that unless their plans for contract termination are put into effect war production will suffer and business will face post-war economic chaos.

What the government agencies and CED want to do is to make the settlement of 250,000 prime contracts and millions of subcontracts subject solely to the discretion of the estimated 10,000 contracting officers now employed by the agencies. Mr. Patterson and Mr. Forrestal, although not setting up any standards under which contracts should be terminated to guide the contracting officers in mak-

ing thousands of accounting and law decisions, have said that they want no restraint or detailed auditing of terminated contracts.

The General Accounting Office which is responsible only to Congress says that it should have jurisdiction to review settlements and that laws should be enacted setting up accounting standards to settle the multitude of questions which are now a matter of individual interpretation.

IN an exchange of letters addressed to Senator James E. Murray, Democrat of Montana, and to Representative Andrew May, Democrat, of Kentucky, who are the chairmen of the Senate Small Business Committee and the House Military Affairs Committee, the undersecretaries sought to rebut criticism of termination policies of the departments made by Comptroller General Lindsay C. Warren.

The letters denied that the service contracting officers would allow millions of dollars worth of wrongful payments if given the absolute power over contract termination policy, as Mr. Warren charged. Denial was also made that contracting officers were responsible for thousands of over-payments made to cost-plus contractors.

However, it is expected that Mr. Warren will substantiate his claims if asked to do so by the House Military Affairs Committee.

Another point Mr. Patterson sought to refute was Mr. Warren's contention that service settlements could not be made final and beyond GAO review. Mr. Patterson's theory is that the First War Powers Act and an executive order gave him this authority.

GAO thinks the reason the services are requesting legislation allowing this practice is that the end of the war will rob the First War Powers Act of any potency.

THE Undersecretaries also did not like Mr. Warren's comment on proposed loans to the contractors based upon termination charges owed to them by the government. Mr. Warren said that any new law enacted should provide that loans should be made on the basis of need for financial assistance for war or civilian production. Mr. Warren also declared that a contractor should be able to exhibit financial ability to repay loans made to him.

Mr. Patterson said the War Department feels that the Comptroller's proposal that loans be made on the basis

of need represents a "misconception" of the purpose of the loan and that any such limitation of the lending power would be extremely unfortunate.

"Not only would it present a difficult administering problem tending to delay financing, but it would also tend to retard resumption of normal operations by many companies which, although not confronted with danger of insolvency, yet should promptly have funds for making payments to subcontractors and suppliers in connection with the contracts being terminated and for resuming civilian production," Mr. Patterson noted.

THE GAO position is that loans for reconversion should be completely divorced from termination settlements. Furthermore, it is reported that GAO feels economic disorders will prevail after the war even if every penny contractors and subcontractors will claim are paid to them immediately, without abatement, and with no accounting review.

The War Department has canceled 8500 contracts worth \$6,000,000,000. Mr. Patterson attacks the GAO proposal that it be given exclusive jurisdiction of settlement of all terminated contracts and the validation of all preliminary advances because contractors' rights have vested under previous termination arrangements.

However, it is said that GAO will advocate prospective legislation affecting contracts containing service termination clauses with the view that Congress has the power to do this wherever contracts have not yet been terminated.

PENDING before the House and Senate Committees on Executive Expenditures are bills introduced by Senator Lister Hill, Democrat, of Alabama, and Representative Carter Manasco, Democrat, of Alabama, to require all sales of surplus property to be made to the highest bidder after proper advertising. Already these bills have War Department opposition.

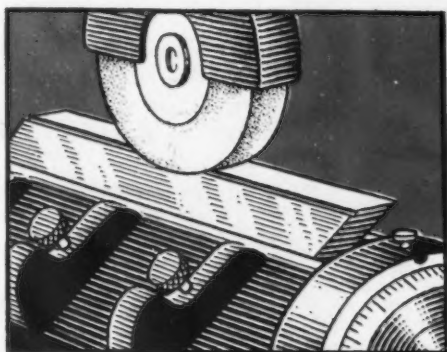
Some WPB officials think that the plan advocated by the services and CED will be a "one-way ticket to self-imprisonment for industry" if Congress accedes.

The fever-pitch assertions that all is lost unless gold by the billions of dollars can be broadcast to industry after the war with no restraint should find some resistance from industry itself. With no standards to guide

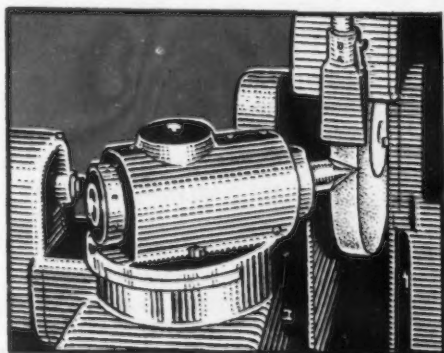
HOW TO

Recondition

GRINDING MACHINE CENTERS AND BLADES



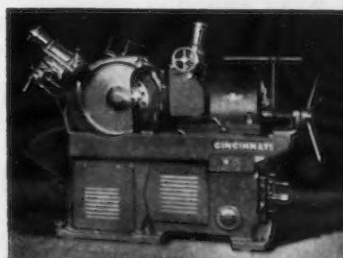
Blades—Sintered carbide and high speed steel blades have remarkable wearing qualities and must be ground carefully because they are very resistant to grinding wheels. During regrinding the wheel becomes dull quickly, and dull wheels check the blade. With the proper precautions, however, a blade can be reground to its original accuracy. Use the correct wheel for blade material; take light cuts (.0005" for h. s. s. and .0002" for the carbides); dress the wheel often; when grinding blades on a surface grinder, flood with coolant. If you use a cutter grinder, be sure to grind dry.



Centers — Worn centers can readily be reground to their original accuracy. High speed steel and tool steel center points may be reground on a plain center-type grinder with the aid of a center grinding fixture; on a universal grinder, with the headstock. Use a soft wheel, (grade M2 Aluminum Oxide, 60 to 80 grain) even though it means changing the wheel already on the machine. Be sure to flood with coolant, *before* the center contacts the wheel. Sintered carbide centers may be reground on a cutter grinder using wheels recommended for the type of material. In either case, take very light cuts (.0002"). Run the center at a high speed. These precautions will prevent "checking" and give your centers many more productive hours.

● Some machine elements do no cutting but, nevertheless, are used up in the manufacturing process and must be classed as "consumable." Centers for center-type grinders and blades for centerless grinders are members of this group. Many of them are made of high speed steel or sintered carbide, both critical materials, and their conservation is just as important as milling cutters, hobs, form tools, etc.

It's not difficult to grind blades and centers. Follow the few fundamental principles outlined at the left, and your blades and centers will be good for a much greater volume of production.



CINCINNATI No. 2 Centerless Grinding Machine. Complete engineering specifications may be obtained by writing for catalog No. G-456-1.



CINCINNATI 12" Hydraulic Universal Grinding Machine. Complete engineering specifications may be obtained by writing for catalog No. G-486-1.

CINCINNATI GRINDERS INCORPORATED CINCINNATI, OHIO, U.S.A.

CENTERTYPE GRINDING MACHINES... CENTERLESS GRINDING MACHINES... CENTERLESS LAPPING MACHINES

them, contracting officers' decisions in making termination settlements favorable to industry could easily arouse public indignation. Congressional sources report some terminations already settled are "shocking."

If business is to resist the march of socialism, a clean war record will be a good arguing point. But virtue is not exciting and many businessmen have already endorsed the services' plan.

Mr. Warren pointed out that the proposal to make loans based on the expenditures by the contractor under war contracts and setting them off in final termination settlements would be bad because of the number of suits the government would have to prosecute or defend on account of this policy. A great many senators and representatives agree with Mr. Warren.

If loans and termination charges are separated and Congress writes termination standards into the laws, contractors will be able to secure loans from commercial banks easily if guaranteed by the government at low interest rates. The manufacturer could easily ascertain the worth of inventories under legislative standards. It could thus serve as collateral. Thereafter the government could pay the manufacturer what was due him under the terminated contract but after an accurate and equitable review.

Mid-War Industrial Conversions To Peace-Time Basis Are Studied

Washington

• • • WPB plans mid-war conversion of industries to a peacetime basis through relaxation of limitation orders in the order of their importance to civilian economy.

Not only does WPB think in terms of mid-war, but of post-war. This was revealed in a report last week made by George P. Comer and Fred E. Berquist, economists of the Department of Justice, to the Senate Special Committee on Post-War Planning.

"From the point of view of industrial facts, WPB is the best equipped agency in Washington to carry on the emergency planning job with the least interruption on Armistice Day," the report declares.

The report says that WPB has the daily working details of practically every industrial plant in the United States. Even the machines in the factory are listed, in many cases, with their complement of workers and their daily output.

Officials have suggested that dismantling of the war economy should be an orderly procedure under an

organization similar to WPB. Some of the problems to be considered are:

1. Shifting labor forces from war to peace production.
2. Control of material flow until civilian scarcities are relieved.
3. Facility disposition.
4. Contract termination and inventory sales.
5. Civilian-type inventories.

Among the controls which it is believed should be carried over through the transition period are: (1) limitation orders; (2) quotas, priorities and allocations.

Some of the programs which it is foreseen should be developed are: (1) Priority time tables of essential products; (2) Coordination of industrial and fiscal policies, including taxation; (3) price and rationing controls until inventories are built up, and (4) special problems, such as stranded communities, small business distress, and the development of new products.

The Justice Department report, which is said to reflect the thinking of a number of WPB officials, says that reconversion gradually will emerge as the war goes on. This is especially true if Germany is defeated a year or more before Japan.

On this point, the report declares:

"From the point of view of the board it seemed to be much more profitable to plan for a series of terraces or stairsteps in letting industry down from the war peak to the peace level, than to fear a precipice over which industry may fall with a crash."

The Board suggests that one of the most important post-war conversion steps is to decide on a program of conversion, industry by industry, and that plans should be made known to the public as soon as strategy will permit.

For example, it might be desirable to call in the former automobile producers and ask for an outline of production plans. It might be decided that during the first several months that only 1942 models should be produced, and materials for this purpose could be allocated at the same time, for the number and kinds of cars.

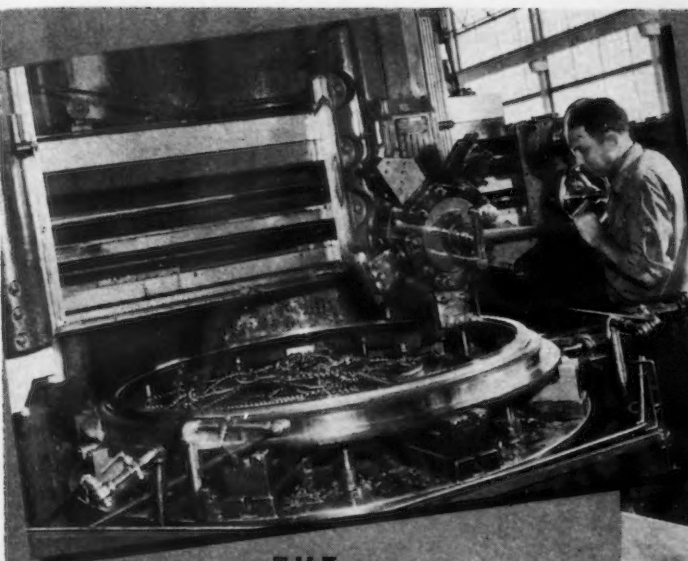
This drastic control should be only for a limited period while present plants are going into volume production and are building up payrolls, the report states.

The agreements, in WPB's opinion, should be cleared with the Justice Department, Anti-trust Division.

THE BULL OF THE WOODS

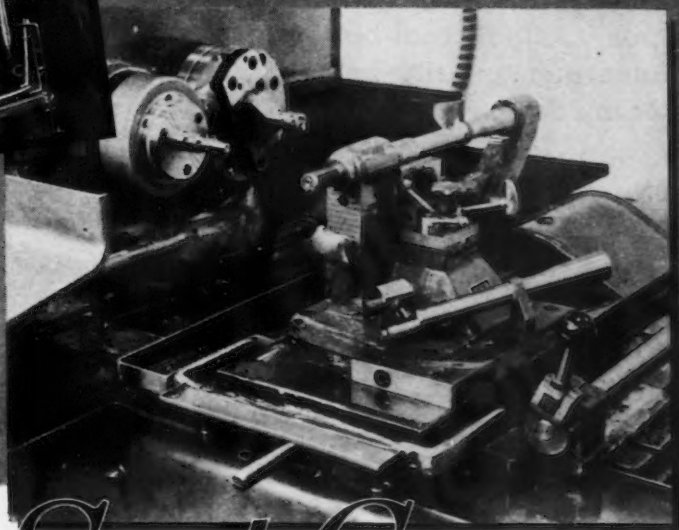
BY J. R. WILLIAMS





THE **STRENGTH**
FOR HEAVY HOGGING
THROUGH TOUGH CAST
STEEL ARMOR PLATE

THE
WEAR RESISTANCE
TO HOLD TOLERANCES
AS CLOSE AS .0002"
ON PRECISION FINISHING



For Every Job of *Steel Cutting* There's a Grade for Top Performance

● Whether your steel cutting job involves heavy hogging cuts such as ploughing through inch-deep cuts in cast armor plate, or light, high-speed work such as when precision finishing—or just average types of machining—you'll find there is a grade of Carboloy Cemented Carbide in each case best suited to give you top performance on steel.

Here are the four Carboloy Cemented Carbide Grades now widely used for steel cutting:

GRADE 78-B—A tough, wear resistant grade for general purpose use on practically all types of steel.

GRADE 78-C—A shock-resistant grade for machin-

ing steel parts on large, heavy duty machines, such as 9'-12' boring mills, 36"-48" lathes, etc. Excellent for interrupted cutting.

GRADE 78—A grade having high resistance to abrasive wear. For finishing and light roughing of practically all steels.

GRADE 831—A grade specially designed for long life on high speed precision finishing.

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CARBIDES
For Cutting
CAST IRON
and
Non-Ferrous Metals

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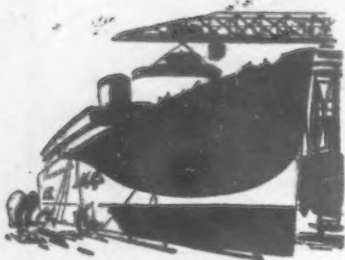
(TRADEMARK) CEMENTED CARBIDES

TITANIUM
TANTALUM
CARBIDES
For Cutting
STEEL

FOR HEAVY HOGGING . . . PRECISION FINISHING . . . INTERMITTENT CUTTING

WEST COAST . . . OSGOOD MURDOCK

• **Miraculous transcontinental rail resourcefulness and masterful Pacific ports warehousing stretch shoestrings to provide for the Pacific rush . . . Industrial balance momentarily better in Pacific Northwest.**



SAN FRANCISCO—You are a plain civilian, say. Without priority, military status or friends in the traffic department, say. You want to go to Chicago on the Streamliner, leaving San Francisco every third day. You want to buy your space so you can be sure of it. The earliest firm reservation now open to you is in January, three months hence. The train is theoretically sold out for three months solid, in advance.

Or, if you want to go to Los Angeles on the nightly still de luxe Lark you won't be able to buy a sleeper until December, two months hence. That's how heavy passenger travel, to, from and on the West Coast is running, and some index of the pressure therefore.

Everyone agrees that the seven Western trans-continental trunk railway systems have met their herculean wartime tasks nobly, but few realize how miraculously. Western district railroads, operating west of Chicago, St. Louis and the Mississippi River from there south, with 67 per cent of the locomotives and 75 per cent of the freight carrying cars they had in 1918, operated 180 per cent of the freight revenue ton miles and 130 per cent of the revenue passenger miles for the year 1942 as compared with the last war. Average freight revenue per ton mile was 0.961c. in 1942 compared to 0.94c. in 1918, but revenue per passenger mile was only 1.8c. instead of 2.52c. in 1918 when, we sadly remember, William G. McAdoo as ad-

ministrator, was in charge in behalf of the government. Fortunately each steam locomotive today has 152 per cent of the tractive power as compared with each average unit 44 years ago. Efficiently exerted steam pressure, expert operation and long extra overtime hours by thin spread veteran operating personnel have done the trick and continued to keep up with the expanding traffic, to the wonder of laymen and in glorious defiance of constant alarmists who have predicted complete transportation breakdown and freight paralysis every next month for the past year.

"We need every pound of our steam for necessary effective war load" say the rail executives on the Coast, "and we need every experienced railroader to keep rolling. They're averaging 10 and 12 hours a day seven days a week and have, month after month. Furthermore, we should have additional materials and equipment for replacement and repair, for the wear, tear, and depreciation which this wide open throttle operation month after month involves is terrific."

Careful analysis of traffic load in the passenger department discloses that along the West Coast, and west of Omaha, Kansas City and St. Paul, approximately 30 per cent of the passenger travel is by service men on furlough, and another 30 per cent is women and families visiting camps, embarkation points and service men. It is the latter group that the railroad men wish could be reduced. Revenue passenger miles for all American railroads have mounted every month. For the first seven months this year there was a 52 per cent increase over the corresponding period for 1942. In July for the first time in railroad history total revenue passenger miles for a single month passed two billion, and passed it by 192,000,000 miles.

SUPPLYING Pacific war industries with raw materials across the 2500 mile gap from the Great Lakes to the Pacific involves astronomical statistics. There are 2500 tons of plates in each Liberty ship. Month after month 75 Liberties are turned out by Pacific Coast yards. That means 187,500 tons of plate, 48 trains of 65 cars each, 3125 60-ton cars that must roll monthly to carry the plates for Liberty ships alone. In addition there are tankers, destroyers and troop carriers in great additional quantities.

A single military procurement agency inquired a week or two ago about the transportation of 237,000 tons from the vicinity of Minneapolis to Puget Sound. Figuring 60 tons to a car, that would require a 65 car train daily for 64 days. No hard pressed railroad wanted it. That is the unhappy obverse of the seemingly simple antidote for scarce manpower on the West Coast when contracts are cancelled or removed to remote areas.

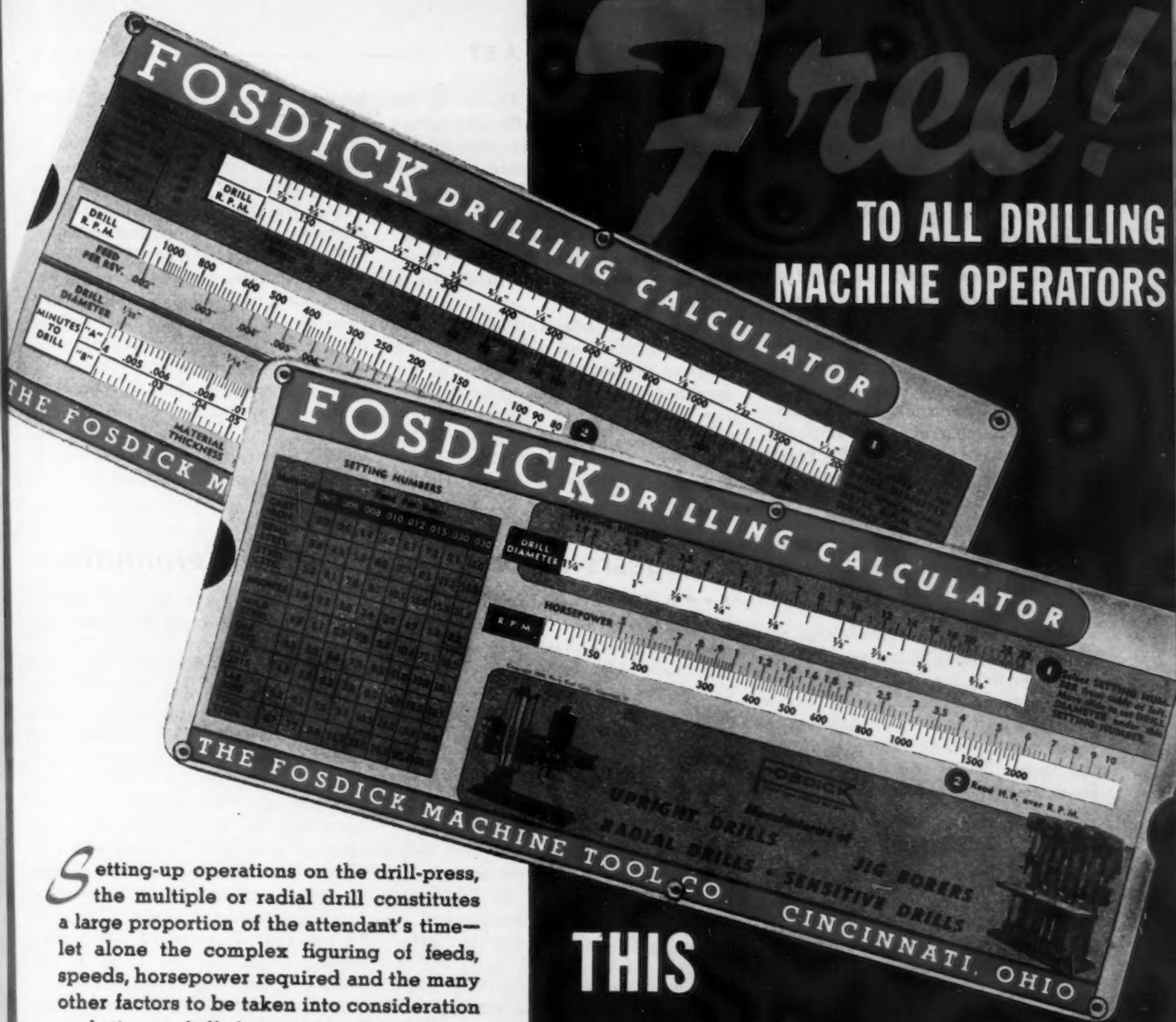
To the immense and unexplainable credit of the privately operated railroads, traffic has moved, schedules have been met, blockades, embargoes and congestion have been brief and scattered; constant, steady acceleration has been handled in stride.

WAREHOUSING and trans-shipment facilities and operations on the West Coast, particularly on San Francisco Bay and Puget Sound are other desperate, threatened bottlenecks which have been a constant menace for the worry wart, but which masterly management, mostly by professional, private traffic and warehousemen, have kept open and moving. Many of the Army service branches, including the Signal Corps, Air, Medical and Chemical Warfare, and the Marine Corps very generally, have undertaken their own warehousing, taking over scattered buildings as available and operating spaciouly with enlisted personnel under officers. On the other hand, the Navy has preferred to work through established warehousemen, feeding into immense central purchasing and shipping transit facilities. The warehouse trade now feels that warehouse space and facilities have been sufficiently increased and storage stocks are sufficiently enlarged to supply the enlarged Pacific operations which the entire West Coast anticipates these coming months. If rail supply lines can be kept open and traffic continually moved, the system seems ready for the huge supply operation which the coming months will involve.

If the pressure should ever threaten to break the arteries, there is always the possibility of resuming at least limited inter-coastal water shipment through the Panama Canal. During the coming year, cargo ships should be relatively more available and ocean submarine hazard less threatening. Unmistakable hints point to a substitution of repair work for new construction in many West Coast ship

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Free!
**TO ALL DRILLING
MACHINE OPERATORS**

Setting-up operations on the drill-press, the multiple or radial drill constitutes a large proportion of the attendant's time—let alone the complex figuring of feeds, speeds, horsepower required and the many other factors to be taken into consideration each time a drill diameter is changed or a new ferrous or non-ferrous metal is machined . . . To lessen the calculating time of the operator and to provide for a more positive, guess-free set-up, FOSDICK has created and assembled a limited quantity of Drilling Calculators on the slide-rule principle. Printed legibly on a durable, varnished stock in four colors, these instruments accurately take into consideration every conceivable factor to be adjudged in the proper drilling of all metals . . . a handy accessory to all drilling equipment—especially to the designed accuracy of the complete FOSDICK line of drilling machinery . . . We invite you to use the handy coupon to obtain prompt delivery of your Calculator!

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Please send me one of your FOSDICK Drilling Calculators as currently announced, without any cost or obligation to me.

Operator's Name.....
Firm Name.....
Address.....
Superintendent.....
Foreman.....
Type Machine Operating.....
Serial Number of Machine.....
How Long Operating Machine.....

yards. One practical and prodigal means of increasing available manpower and restoring better industrial balance on the West Coast would be in connection with reduced new ship construction and resumed inter-coastal ocean traffic.

THOSE new slightly sharper teeth in manpower and project control are beginning to bite a little, with the result that more odd lots of leftover material from contracts cancelled or unrenowned are reported appearing. Some smaller operators are complaining and a number of lesser shipbuilders and sub-contractors in the Pacific Northwest have been slowed down or stopped. Increased personnel and better organized representatives of the Smaller War Plants Corp. are doing what they can to ease the let-down and convert facilities where possible to more vital operations.

At Seattle, Isaacson Iron Works has installed a second 25-ton electric furnace, doubling the capacity for forging ingots inaugurated only a few months ago. All raw material is scrap and all finished products are for the Navy. Isaacson reports no labor shortage and over its main entrance the sign reads "Through These Gates Pass the Best Workmen in America". Bremerton Navy Yard still needs 10,000 workers, preferably repairmen. In the past 45 days Boeing has added 2600 net workers with 900 still to come from recruiting crews in outlying areas. In general, the manpower turmoil has subsided, at least temporarily, around Puget Sound.

Aluminum Co. of America is negotiating for the purchase of the Pope & Talbott Lumber Co. which includes the McCormick Steamship Co. and

thereby hangs a tale. Operators for some time of the Alcoa fleet, as agents on the West Coast, the McCormick-Pope-Talbott interests are also owners of what are said to be the best alumina clay deposits in the Pacific Northwest near Castle Rock in southwestern Washington. Bureau of Mines estimates indicate from 10,000,000 to 40,000,000 tons.

Just as the Los Angeles area has set its heart on an aluminum rolling mill, so the Pacific Northwest is determined to secure government blessing on a plant to extract alumina from clay. Bauxite for aluminum reduction now comes from South America and the Southern United

States. All existing reduction plants are in Gulf ports and St. Louis. After this first reduction, the material is shipped to Spokane, the Columbia River extrusion plants, or to Las Vegas, Nevada for the application of electric power in aluminum refining.

Earlier in the month WPB rejected Pacific Northwest pleas for a \$4,000,000 pilot plant when Vice-Chairman Charles E. Wilson told the zealous delegation "We've got so much aluminum it is running out of our ears." But the Northwest alumina committee continues to function, to agitate and to hope, and latest speculation revolves about the Alcoa-McCormick Steamship-Pope-Talbott deal.

Suggests Income Tax Plan for Termination

• • • Wilfred Sykes, president of Inland Steel Co., who last week addressed the National Wholesale Hardware Association and the National Association of Sheet Metal Distributors in their annual meeting at the Hotel Commodore, New York, said, "The system of free enterprise can be wrecked in the postwar period by a tax structure which places an undue burden upon industry." He advocated the free competitive enterprise system as the only common-sense method to follow in giving citizens an opportunity to carve out their own destinies after the war.

"Before we get out of this war," Sykes explained, "there will be contract terminations totaling possibly \$75,000,000,000. There are perhaps 100,000 contracts of substantial volume outstanding today, and these

are probably broken down into something on the order of 1,000,000 sub-contracts.

He proposed a method for contract terminations along the lines followed in meeting income tax requirements, where taxes are paid on the basis of sworn statements of individuals and companies.

Referring to the income tax procedure he pointed out that the government checks the returns and if it "does not think we have paid enough we have a claim entered against us for the additional sum." Probably 95 per cent or more of all income taxes are paid on the basis of the original returns, he reminded.

If upon submission of suitable returns which could be worked up along the lines of the income tax returns, it would be mandatory for the government to pay, say 90 per cent of the claims, I don't think that there would be very much risk to the government, but certainly it would allow the wheels of industry to get turning rapidly."

With regard to the disposal of surplus goods in possession of the government at the end of the war, Sykes advocated action of a disposal board on which industries concerned are represented. The system which he suggested offers, he said:

1. Steady employment of men, materials and money;
2. Pay for owners, management and labor based on performance, and performance only;
3. Not only more of the accustomed goods, but better goods and goods we have never had before, due to technological advances;
4. Fair prices which will move these goods into a rising standard of living, through competition;
5. An opportunity for the American public to profit from the part of their pay which citizens are able to save, either by direct investment for dividends, or by entrusting it to a savings bank or insurance company which invests it for them and returns them interest.



... Cited for Awards ...

• • • The following companies have been awarded the Army-Navy "E" award for meritorious service on the production front.

Wagner Electric Corp., St. Louis
Briggs Clarifier Co., Washington
Lodge & Shipley Machine Tool Co., Cincinnati (third renewal)
Amperex Electronics Products, Brooklyn plant
David Bell Co., Inc., Main Plant, Buffalo
Bird & Co., Watham, Mass.
Crescent Panel Co., Louisville, Ky.
E. I. du Pont de Nemours & Co., Inc., Parlin, N. J.

Esvey Mfg. Co., Inc., New York
Herman Nelson Corp., Moline, Ill.
Package Machinery Co., Springfield, Mass.
Payne Furnace & Supply Co., Inc., Beverly Hills, Cal.
Reeves Sound Laboratories, New York
Sonoco Products Co., Hartsville Plant, S. C.

Office of Civilian Defense National Security Awards

Caterpillar Tractor Co., Peoria, Ill.

Auxiliary Military Police Guidon

Cincinnati Milling Machine Co., Cincinnati

THIS REDESIGN JOB

saves alloys, dries film 500% faster!

A bomber lands at its base after blasting an enemy target. Technicians unload cameras, rush films to the dark room for developing, drying and printing. A short time later intelligence officers know how many more Axis strongholds are out of commission.

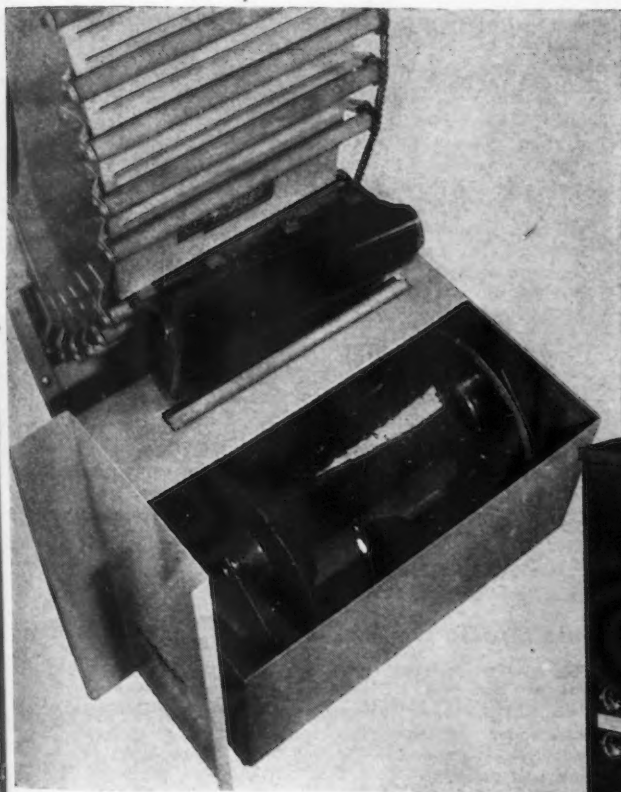
Drying of film, which formerly required three hours, now takes thirty minutes. This fast work is made possible by a new kind of roll-film drier perfected for the Air Corps. Heat, humidity, and even

dust are controlled. A blower spreads 2000 cubic feet of conditioned air a minute over the revolving film. Correct temperatures are maintained by two electric heaters.

Time-saving in the field is only one advantage of this redesigned drier. Critical alloys are saved too. ARMCO ZINCGRIP-PAINTGRIP replaces scarcer metals on all structural parts. Top and sides are painted inside and out to assure long, trouble-free service.

ARMCO ZINCGRIP-PAINTGRIP is a *special-purpose* galvanized sheet that can be formed or drawn without flaking or peeling of the protective zinc coating. Its bonderized PAINTGRIP surface needs no etching to take paint. The PAINTGRIP coating *preserves* paint, keeps it smooth and serviceable longer.

Do these advantages of ARMCO ZINCGRIP-PAINTGRIP suggest ways for you to save critical alloys in your war products—or later for peacetime uses? For complete information just write to The American Rolling Mill Company, 2251 Curtis Street, Middletown, Ohio.



PHOTOS COURTESY THE LAU BLOWER COMPANY



THE AMERICAN ROLLING MILL COMPANY

Fatigue Cracks . . .

BY A. H. DIX

Timber!

• • • Although hardly a yawn to you, the wood pulp situation is a gasp to us. The outlook ranges from dismal to alarming. Reason: shortage of tree cutters. Fearing that you would languish if your supply of the printed word were curtailed, the paper people are urging that prisoners of war be sent into the woods. But an international agreement regulating the employment of p.o.w.'s stands in the way. It seems that lumbering is classed as a hazardous occupation, which would no doubt seem highly humorous to the p.o.w.'s.

So we have to save pulp, which means that paper gets thinner and thinner. Take for instance your favorite family journal. Until eight months ago it was printed on 52½ lb. stock, and now it is down to 40 lb., which means that 500 sheets (a ream), 25 in. wide by 38 in. long, weigh 40 lb.

This 24 per cent reduction in weight of paper is likely to fool you when you heft a copy. Our lissom figure is deceptive. The truth is that the average number of pages per copy is now greater than it has been since the '20s, and is still rising.

Aptronyms

Mrs. Edith Riggle, Mona Lake, Muskegon, Mich., sells worms for fishing bait.

—A. H. Frauenthal, President,
Kaydon Engineering Corp., Muskegon, Mich.

Osgood ("West Coast," see page 72) Murdock thinks the U. S. Army Corps of Engineers did a neat bit of suiting the name to the job in selecting the officer to head up the Pacific Division's camouflage activities. He is Lt. Col. Hazenbush.

Slogan, Complete with Odor

• • • The brains department's Bill Phair hands us an announcement issued by the O'Sullivan rubber heel people to the effect that they are sponsoring Leon Henderson on the radio and are billing the act as "America's No. 1 heel." As O'Sullivan is no advertiser of ours we can be frank. The slogan strikes us as one of those strokes of genius that seem brilliant only during that generous and uncritical interval between the fifth high-ball and the ensuing hangover. How it survived the cold scrutiny of the morning after we'll never know. If Mr. O'Sullivan himself thought it up a friend should tell him that his brainchild has the perfume of burning rubber.

What brought this up is a clipping from the New Center News (Detroit) sent us by Miss Sedna (Automotive Council for War Production) Boyle, reading:

A rubber heel which conducts electricity instead of insulating against it has been developed.

Understudy for F. F. J.

• • • Speaking of slogans, we like the one used by the W. H. Hobbs Supply Co., Eau Claire, Wis.—"Busy Since 1885." We saw it on a letter from V. H. Kildahl, who writes:

May I come in as the 19th reader of "Fatigue Cracks?" I have been faithfully perusing the pages of the B.S.J. for at least 20 years.

B.S.J. mystifies us. The "J" undoubtedly stands for "journal," and if Mr. Kildahl did not disarm us by referring to us elsewhere in his letter as an "august publication," we would be afraid to inquire what the first two initials mean. What, Mr. Kildahl, does B.S.J. signify?

Glamorous B.V.D.'s

• • • Then again maybe it would be better if B.S.J. remained a mystery. For we have noticed that it is

usually a mistake for a manufacturer to break down and tell what his trade mark initials represent. All our life we had been impressed by the letters "O.N.T." on spools of Clark's thread, and it was a great disappointment to learn that it stood for anything as moronic as "Our Nice Thread." Krueger's, a local beer, features its trade mark "P.O.N." in huge electric signs. We experienced a decided letdown when we heard that this means nothing more than "Pride of Newark."

B.V.D.'s have always remained glamorous in our eyes because the makers have been astute enough to keep the meaning of the initials a secret, and we were far more impressed with "V.V.O." on a bottle of whiskey before we learned that the initials means merely "very, very old." The ideal trade mark initials are therefore those that are pulled at random out of a hat. Having no significance, their secret can never be broken. So if Mr. Kildahl tells us that B.S.J. means nothing whatever, we shall be content.

Stoppers

• • • 5222 Chances to Miss a Kaga — Russell, Burdsall & Ward Bolt and Nut Co.

Morale Building Stopped Production—The Iron Age.

Bouquet for Advertisers

You might be interested in knowing that of the five advertisements in your Sept. 23 issue, containing pictures of Army planes, the majority—three—show the new insignia, the familiar star with a white stripe on either side. The stripes were adopted in July to promote differentiation from Jap planes.

May I congratulate your advertisers on their up-to-dateness? You know, of course, that still another change has been ordered by the brig. gen. in charge of plane markings—a new color for the border surrounding the white stripes.

—Harold F. Cotter,
School of Chemistry, Metallurgy and Ceramics,
University of Alabama

The alertness of our advertisers is a reflection of their connection with a fast-moving industry. Their laudable passion for timeliness is abetted by the fact that this journal is published every week and that hardly more than a week elapses between the time our advertising forms close and the time you see the advertisement. In the case of the big general magazines the advertiser has to have his copy in a month or two before the date of issue.

Delphic Oracle Continues to Bat 1.000

An inquirer on your Dear Editor page wants to know what a "Gay die" is. The answer lies in semantics. "Wild" beer means running over with too much zest; "hot" colors, meaning too much life in them; "flush" production, meaning an oil well that is producing too much, and so on.

A "Gay die" undoubtedly means one that needs to be taken down a little.

—Deac

Puzzles

The price of last week's wine was 110 francs a cask, and the duty 10 francs.

Newport News Shipbuilding & Drydock Co. scored twice this week. A. K. Hutton of that company solved the Oct. 7 subway train problem, which we regard as one of the best we have ever run, and Lt. Com. A. R. Simpson, same company, tossed off the highly difficult Sept. 30 ball problem without even breathing heavily.

Paul Penfield, James T. Gordon, and W. H. Scott complain that the answer to the Sept. 9 trolley problem was wrong. All agree that the right answer is 4 mph for the trolley and 1.6 mph for the man. We apologize for the author of our puzzle book.

K. Millsaps wants to know if we have the pre-Diesel one about the fireman, the conductor and the brakeman. We haven't. Can anyone supply it?

This trifle you should solve in 4 min. or less:
A says, "I have what the second has and the third of what the third has." B: "I have what the third has and the third of what the first has." C: "And I have \$10 and the third of what the second has." How much has each?

Northern SUPER-CRANES

**MATERIALS HANDLING
CAN'T BE SUBCONTRACTED**

YOU MUST HAVE RELIABLE CRANES

If a lathe, shaper, milling machine or other tool breaks down you may be in serious difficulty. But work can be subcontracted—ways found to meet the emergency.

But if a crane breaks down, the shop it serves is tied up until repairs are made. Materials Handling is one job that can't be subcontracted. You have to have reliable cranes for the heavy load of war production.

NORTHERN USERS HAVE ASSURANCE OF RELIABILITY IN THESE EXCLUSIVE FEATURES:

1. Rigid one-piece welded steel trolley construction.
2. Transmission type single unit, oil tight gear reduction.
3. Easily removable gear case covers. Splash lubrication of gears.
4. Heavy section girders designed for extreme lateral and vertical loads.
5. Heavy duty roller bearings, turned and ground shafts, press fits on gears, wheels, etc.
6. Standard heavy duty anti-friction bearing crane motors—oversize for severe service.
7. Control equipment built by the outstanding specialists in industrial control.
8. Special heavy duty crane wiring construction to insure safety and eliminate wiring troubles.
9. Unit bridge drive mechanism combined with heavy welded steel end trucks.
10. Hoist and bridge brakes designed for extreme loads and hard service.

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Dear Editor:

SPINNING MAGNESIUM

Sir:

We notice in your Aug. 26 issue the mention of centrifugal casting of aluminum and magnesium. The statement is made that one foundry feels confident that the oxidation problem in magnesium has been solved.

Can you supply us with the name of the foundry referred to?

T. E. PIPER,
Process Engineer

Northrop Aircraft, Inc.,
Northrop Field,
Hawthorne, Cal.

● We are still unable to divulge the name of the plant that inspired the comment in our Aug. 26 issue. The work is still largely experimental. A good bit of work is being done in the way of spinning magnesium castings, and as soon as progress warrants it we shall publish a report.—Ed.

WRONG FIGURE

Sir:

On page 70 of your July 15 issue, "The Annealing of Steel," by Peter Payson, the second sentence of the second paragraph reads, "The TTT curve (Fig. 26) . . .", but upon referring to Fig. 26 on page 72 it is found that this figure deals with NE 8442 steel.

ROBERT S. ROSE
Vanadium-Alloys Steel Co.,
10 High Street,
Boston, Mass.

● This was an editorial error. The proper reference is to Fig. 7. A correcting item was published on page 70 of our Sept. 9 issue, but as it was separated from the article, it was no doubt missed by many of our readers.—Ed.

SURFACE HARDNESS

Sir:

Your Oct. 7 "News Front" refers to a newly devised, sand impact-optical reflectivity method to make possible accurate hardness measurements of thin surface layers. Where can I get more information concerning this?

L. B. SCHMIDT
1422 Oliver Bldg.,
Pittsburgh 22

● On pages 43-45 of Sept. 30 Iron Age.—Ed.

BEST FINISH WITHOUT GRINDING

Sir:

In our war work, we are turning a section 6 in. long and $\frac{5}{8}$ -in. dia. in the center of a round $\frac{7}{8}$ -in. rod, 10 $\frac{1}{2}$ in. long. The material is C1019 hot rolled steel. We are using Rex AA tools. How can we obtain the best possible finish without grinding?

H. H. MONTAGUE
MontaMower Co.,
Traverse City, Mich.

● We recommend a cutting speed of 200-300 ft. per min., which would mean a spindle speed of 1200-1800 r.p.m. The feed should be kept light, somewhere between 0.010 and

0.020 in. per rev. A soluble oil is suggested as a coolant. The tool should have about a 12 deg. side rake and 0 deg. back rake. The front and side relief or clearance angles should be from 6-8 deg. A fairly large proportion of the end of the tool should bear directly on the turned surface. The purpose of this is to remove any helical tool scratches that might be left by a tool having a sharp point.—Ed.

BOOKS ON TINNING

Sir:

Friends of ours in South America asked us to supply them with books on tin plating, particularly on the tin coating of soft sheets. What would you recommend?

F. R. JEFFREY
International Minerals & Metals Corp.,
11 Broadway,
New York 4

● The best source of information is the International Tin Research Council, whose American representative is the Battelle Memorial Institute, Columbus, Ohio. A letter addressed to Battelle will doubtless bring you a number of excellent booklets on the subject.—Ed.

CORROSION PREVENTION

Sir:

Page 64 of your Sept. 2 issue abstracts an article by V. C. J. Nightingall on the prevention of iron and steel corrosion by applying zinc compounds. The article appeared in the Australian Journal of the Institute of Engineers for November, 1942.

I am anxious to obtain the complete article.

O. B. ELLIS,
Research Engineer
American Rolling Mill Co.,
Middletown, Ohio

● The Engineering Library, 29 West 39th St., New York, maintains a comprehensive file of foreign (and domestic) technical journals. It furnishes photostats at a nominal charge.—Ed.

PLATE AND SHAPE HANDBOOK

Sir:

We understand that a new Steel Plate and Shape Handbook is soon to be published by THE IRON AGE. We would like to have information as to its scope, contents, price, and when available.

R. W. THRASHER,
Production Manager
Gary Steel Products Corp.,
25th Street near Hampton Blvd.,
Norfolk, Va.

● The Iron Age has issued nothing of this kind. However, in March the American Iron and Steel Institute, Empire State Bldg., New York, issued a manual on plates, 92 pages, price 25¢, containing general definitions, data on manufacturing processes, chemical requirements, standard mill practices and specifications. In April a similar manual was issued on shapes. Same publisher, same price.

Or you may have in mind the 400-page book, "Steel Construction," published by the American Institute of Steel Construction, 101 Park Ave., New York. This is a manual for engineers, architects and fabri-

cators, containing details of structural shapes. The current edition (the third) was issued in 1941. Price \$2.—Ed.

FATIGUE LIMIT

Sir:

The Technical Advisory Service of the Smaller War Plants Corp. has received this inquiry. Can you help?

"We are desirous of getting information on the fatigue limit in air and salt water of bronze, 88 per cent copper, 10 per cent tin and 2 per cent zinc at 10^6 , 5×10^7 and 10^8 cycles. If possible, we would like to secure a curve of the fatigue strength at various cycles."

ROY L. CLARK,
Technical Advisory Consultant
Smaller War Plants Corp.,
226 W. Jackson Blvd.,
Chicago 6

● Try the American Society for Testing Materials, 260 S. Broad St., Philadelphia.—Ed.

ELEVATOR SAFETY CODE

Sir:

Can you tell us where we can obtain a copy of the American Standard Safety Code for Elevators?

J. BANNERMAN,
Buyer
Bruntons,
Musselburgh, Scotland

● From the American Society of Mechanical Engineers, 29 West 39th St., New York, price \$1.25 plus overseas postage.—Ed.

MACHINING MAGNESIUM

Sir:

I am interested in obtaining definite information as to the speeds, feeds and cuts at which magnesium may be turned.

GEORGE D. HARTLEY
372 May Street,
Worcester, Mass.

● Try the Dow Chemical Co., Midland, Mich., and American Magnesium Corp., Gulf Bldg., Pittsburgh.—Ed.

COMPARABLE ELECTRODES

Sir:

Will you please furnish the writer with one or two reprints of "Comparable Arc Welding Electrode Tables," originally published in your May 13 issue? We have definite need for them in our laboratories and shops.

J. H. HRUSKA,
Director of Tests & Inspection
Electro-Motive Div.,
General Motors Corp.,
LaGrange, Ill.

Sir:

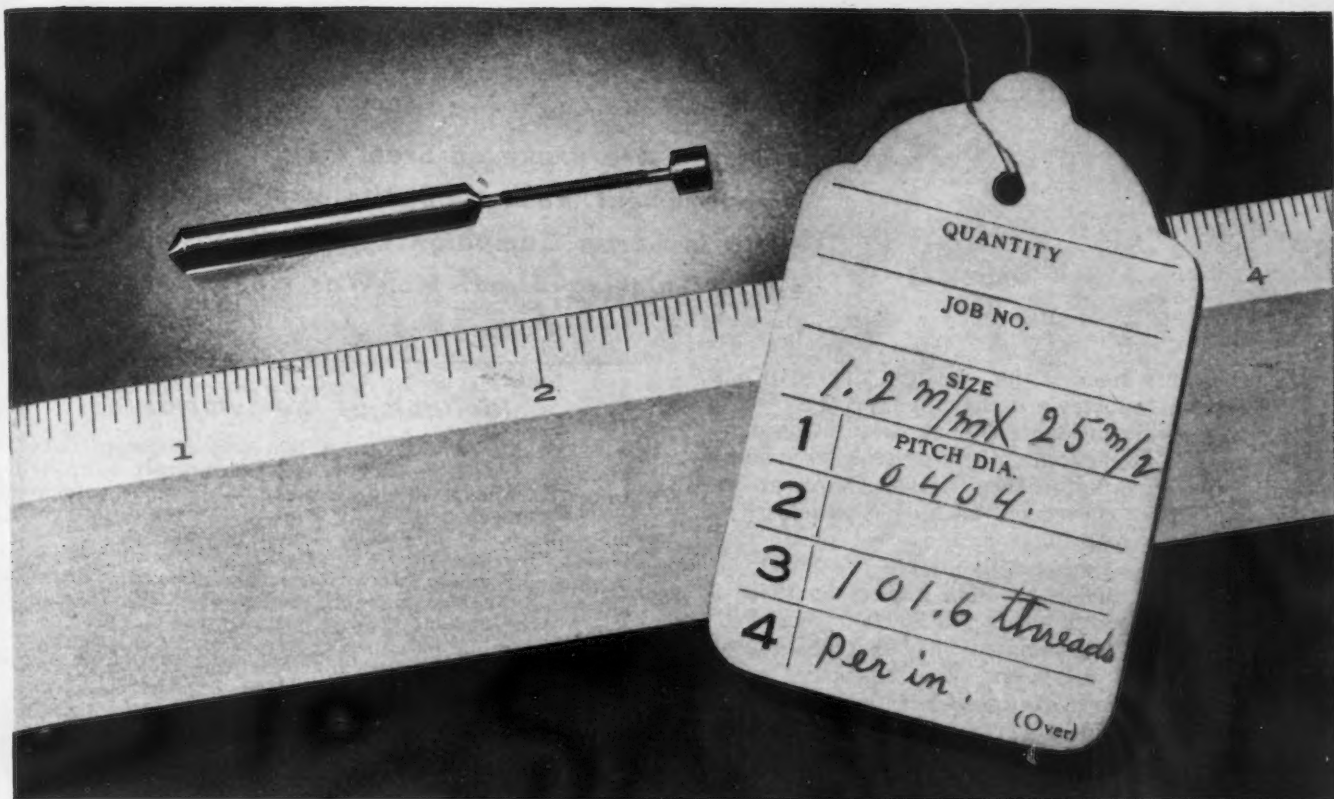
Will you please send us two copies of your reprint, "Comparable Arc Welding Electrode Tables"?

H. D. NEWELL,
Chief Metallurgist
Babcock & Wilcox Tube Co.,
Beaver Falls, Pa.

Sir:

We are interested in receiving six reprints of "Comparable Arc Welding Electrode Tables."

D. L. BOTHAM,
President
Wisconsin Foundry & Machine Co.,
Madison 1, Wis.



101.6 threads per inch . . . chased on a Monarch Lathe!

If you're troubled with thread chasing on very small jobs like this one, take a lesson from this manufacturer and do them on a Monarch 10" Precision Toolmaker's Lathe.

For this job, the gear train carries special gears for 101.6 threads per inch. The lathe is also equipped with Monarch's electric leadscrew reverse and rapid return. Threads are chased toward the headstock at 425 rpm., and with leadscrew reverse controls on the apron, the carriage is returned to the starting position at

1000 rpm., or faster if desired.

Thus, the thread chasing is done accurately, and valuable production time is saved by the young woman operator who does the job.

This example is just one of a wide variety of close tolerance work which can be done on Monarch 10" Precision Toolmaker's Lathes. If you think you have jobs which these machines might do more quickly and accurately than by your present methods, we'll be glad to work with you.

THE MONARCH MACHINE TOOL COMPANY • SIDNEY • OHIO

MONARCH LATHES
Save Time

This Industrial Week . . .

- **Strikes Are Brake on Steel's Big Push**
- **Government, Business Battle at Washington**
- **Lag in Scrap Campaign Causes Uneasiness**
- **WPB Thinking About Mid-War Conversions**

TWO events sharing the spotlight currently are the steel industry's determined drive to set a new monthly production peak despite the damaging effect of strikes, and the outbreak of a fierce battle on the Washington front between government and business over contract cancellation policies.

This week's loss of iron and steel production because of the coal mine walkouts in the South increases the total deficit of such strikes in 1943 to somewhere in the neighborhood of 350,000 tons. Production this week is estimated by THE IRON AGE at 100 per cent, down one point. Most observers agree that there will be no lasting peace in the coal industry until the wage controversy is settled.

Although they concede worry over the threatening effect of strikes and manpower shortages and the disturbing fact that the national scrap drive is not proceeding as well as expected, steel executives see the industry in a more comfortable position in several respects. No longer is there a shortage of basic steel, and there is ample alloy steel to suit all needs. Plates and sheets remain tight, but it is expected that relief will come in a few months.

WPB Steel Division figures show that September production of plates was 1,106,851 tons. This compares with 1,060,936 tons produced in August.

Late shifts in Steel Division plants for remedying the flat rolled situation have brought the decision not to place over-orders for 100,000 tons of sheets as had been reported.

Indicative of the leeway existing currently in raw steel supplies, Chicago mills have been approached to purchase ingots reported rapidly banking up behind the bottleneck of blooming and slabbing mill limitations in the Pittsburgh and Youngstown districts and have even been urged to accept excess ingot from southern California.

THE fight in Washington over contract cancellation policy involves every major department of the government connected with war procurement and every business and labor interest represented in Washington.

Undersecretary of War Patterson and Under-

Sidelights of the Summary

• • • Despite the fact it has scores of subcontracts to offer magnesium die-casters, a large aircraft company in the East has been able to place only a small amount of the work to date . . . Use of the nickel-chromium-molybdenum alloy steels should be increased to at least 60 per cent of the total alloy steel produced for engineering and construction purposes, it was urged at a recent advisory committee meeting in Washington . . . A quiet campaign to permit only the "highly successful" shipbuilders to accept new ship construction is reported being waged in at least one section of the nation . . . One steel company loaded 966 refrigerator cars to West Coast destinations in three months, thereby freeing many box cars . . . The serious manpower shortage is reported to have affected production of cartridge brass strip . . . Aluminum fabricators, worried by the manpower situation which is preventing the diversion of raw material for essential civilian goods were meeting in New York this week, seeking clarification of the confused picture.

secretary of the Navy Forrestal who have the support of the Committee for Economic Development, WPB and the Maritime Commission, assert that unless their plans for contract termination are put into effect war production will suffer and business will face post-war economic chaos. What they desire is to make the settlement of 250,000 prime contracts and millions of subcontracts subject solely to the discretion of the estimated 10,000 contracting officers now employed by the agencies.

The General Accounting Office which is responsible only to Congress says that it should have jurisdiction to review settlements and that laws should be enacted setting up accounting standards to settle the multitude of questions which are now a matter of individual interpretation.

Mr. Patterson's testimony made it plain the War Department wanted no outside interference, and that the proposition of paying contractors 75 per cent and of loaning them the remainder owed by the government was not agreeable to the War Department either. He told the House Military Affairs Committee that procurement agencies should be given legislative authority to negotiate all final settlements of terminated contracts without interference or review by either the General Accounting Office or the courts. He also held that procurement agencies should be empowered to loan money to contractors for financing them in the period between the cancellation of contracts and final settlement.

MR. WARREN, who plainly had the sympathy of his former colleagues of the House Military Affairs Committee, told the committee it was their public duty to: (1) Pass a resolution stopping all war contracting agencies from settling terminated con-

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tracts and from inserting termination clauses in future contracts, and (2) To pass a contract termination law as quickly as possible which would be equally fair to contractors and to the government.

Simultaneously with the outbreak of the fight, President Roosevelt announced the creating of a unit within the Office of War Mobilization to deal with the problems of war and post-war adjustment, and said that unified programs and policies for government agencies will be developed. Meanwhile, it was revealed last week that WPB is thinking about mid-war conversion of industries to a peacetime basis through relaxation of limitation orders in the order of their importance to civilian economy. Not only does WPB think in terms of mid-war, but of post-war, according to a report last week made by economists of the Department of Justice to the Senate Special Committee on Post-War Planning.

Fears that the current national scrap drive will fail to achieve its goal were voiced in many quarters during the past week as preliminary reports on collections came out. These reports are said to indicate that very few areas will be able to reach their quotas. At the same time reports of scrap shortages in certain key steel making centers increased. Permitting the use of premium electric furnace scrap in open hearths would help alleviate the situation, in the opinion of some scrap experts.

In Chicago last week, officials of two major farm equipment manufacturers last week warned that unless the raw materials and component parts were provided more liberally, fewer farm machines would be produced for the 1944 crop season than were available in the year ending June 30, 1943.

NATIONAL steel ingot production has dropped one point to 100 per cent of rated capacity from last week's high of 101 per cent. Contributing to the decline this week are the decreases in Pittsburgh, down half a point to 102.5 per cent; Chicago, down two

Ample Steel is View at Pittsburgh

Pittsburgh

• • • Few authorities will admit it for fear of being accused of spreading complacency stories, but apparently the battle for steel is won. Except for temporary tightness in specific products, there is probably more than enough steel now being made to adequately carry on both theatres of the war. (This development was forecast on these summary pages upon several occasions in recent months.)

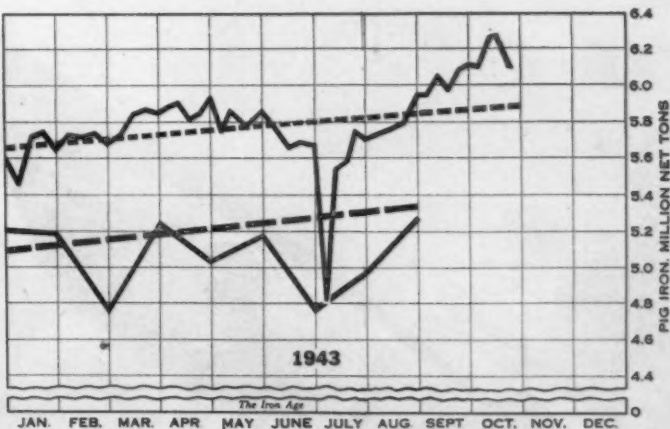
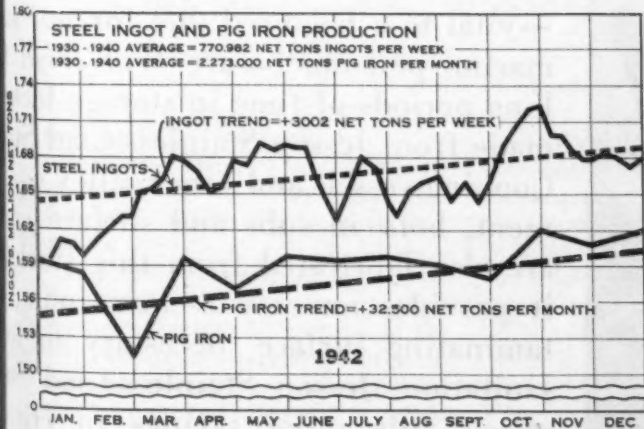
Indications of this viewpoint are found in the scurrying around by WPB in reshuffling ingots. Another signpost is the reshuffling of alloy steel in order to keep electric furnaces fully engaged.

From time to time, due to changes abroad, there will probably continue to be temporary periods of shortages for certain products—a condition which was bound to occur, regardless of capacity, when sudden demands for specific items in a short space of time materialize.

With the exception of flat rolled products, the demand for which has been exceptionally strong from the Maritime Commission, there has been a new low in customer complaints over steel product deliveries. Concrete bars are easier, certain carbon and alloy bar sizes are expected to be easier soon, structural mill space is available, steel ingots are plentiful, and steel billets may be more plentiful in the near future.

and a half points to 99.5 per cent; Youngstown, down one and a half to 97 per cent; Cincinnati, off six to 103 per cent and the Eastern district, down two and a half to 99 per cent. Because of the coal strike in Alabama mines, the Birmingham district operating rate has fallen seven points to 95 per cent. Some district gains in output have been made; namely in Philadelphia up half a point to 94 per cent and in Detroit up six points to 104 per cent. Continuing at the same rate as last week are Cleveland at 97, Wheeling at 104 and St. Louis at 106.5 per cent.

The Iron Age



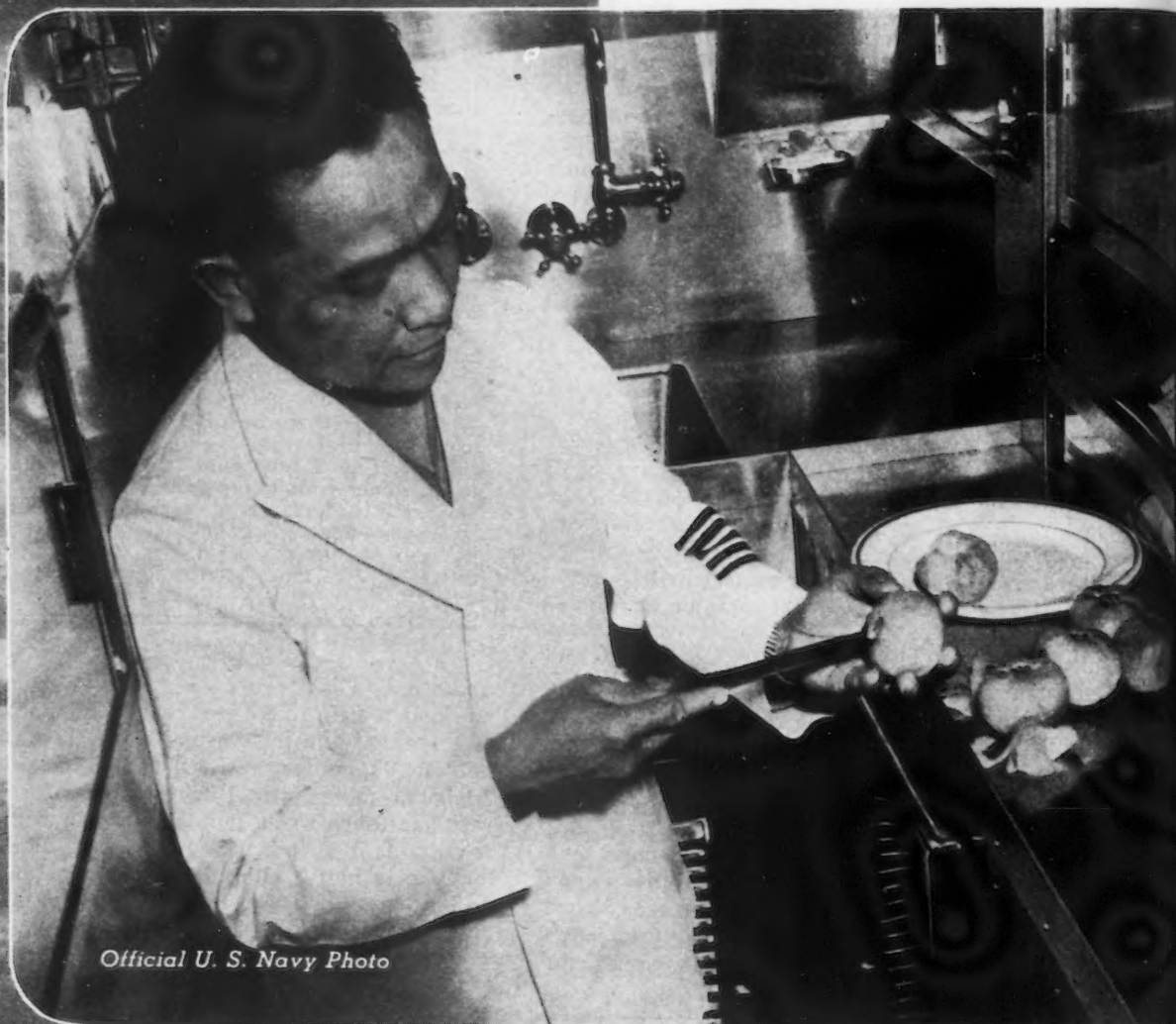
Steel Ingot Production by Districts and Per Cent of Capacity

Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St. Louis	East	Aggregate
October 14	103.0	102.0	98.5	93.5	97.0*	104.5	104.0	102.0	98.0	95.0	109.0	108.5	101.5	101.0
October 21	102.5	99.5	97.0	94.0	97.0	106.5	104.0	95.0	104.0	95.0	103.0	106.5	99.0	100.0

*Revise.

FRESH FRUITS

at 40 Fathoms



Official U. S. Navy Photo

Fresh fruits, meats, and vegetables—vital to a balanced diet for our submarine personnel—are kept fresh for long periods of time in storage lockers made from Jessop Stainless-Clad Steel. Cooking vessels and other galley equipment, both in subs and surface craft, are also fabricated from this steel. It provides an easy-to-clean, non-contaminating surface necessary to for sanitation. Jessop Stainless-Clad Steel effects substantial savings in critical alloys and material costs. This is another example of Jessop Steels at Work.

JESSOP STEEL Company

HEAD OFFICE AND WORKS WASHINGTON, PA.





Press Ass'n Photo.

Scrap Drive Seen Missing Quota; Mills to Buy Million Tons

••• Fears that the current national scrap drive will fail to achieve its goal were voiced in many quarters this past week as preliminary reports on collections were received. These reports are said to indicate that very few areas will be able to reach their quotas.

The drive was designed to build up "Victory Banks" of scrap supplies as insurance against a shortage in the event of winter emergencies and such potentialities as an early closing down of ore shipping on the Lakes or another coal mine strike.

The apathy shown toward the drive by the general public, as well as by many industrial areas, plus the fact that in some steel making centers, notably Cleveland, Youngstown, Warren and Canton, Ohio, and Philadelphia, a shortage of open hearth grades

already is reported, is causing considerable concern to steel mill operating men and WPB salvage officials.

Chief cause of the lukewarm support being given the drive is generally attributed to the lack of adequate preparation for the drive, particularly with respect to national publicity, and an absence of proper organization among the many committees, indus-

tries and associations participating in the effort.

It is also pointed out that the drive is partially a victim of the nation-wide apathy noticeable since the Allies went on the offensive.

Planning for this scrap drive is reported to have started only a few weeks before the opening of the campaign, while in the past nation-wide drives have usually been preceded by several months of preparation and publicity.

In view of the poor start of the current campaign, it is expected that renewed efforts will be made to spur enthusiasm in the drive and to obtain as much material as possible despite the poor start. The drive will end on Nov. 15, and the advent of cold weather in most industrial states coinciding with that time makes it impossible to

NAZI BEARING PLANT CRIPPLED:

Last week's attack by Flying Fortresses on the Schweinfurt bearing works cost 60 bombers but authorities said this was an "equitable price." Nazi military aircraft absorbed a large part of the output of the works. This is a photo of the plant being bombed Aug. 17.

Burden of Drive Rests on Industrial Scrap

... The burden of the present drive to improve iron and steel scrap inventories rests upon industrial salvage. Right now the nation's mills and factories have a real opportunity to strike a blow at the Axis through bettering scrap collections. At the same time (as J. H. Van Deventer, editor of this magazine, pointed out in his editorial June 18, 1942) consumers of steel can help themselves to more steel by pitching into the scrap campaign. Here are a couple of pertinent quotes from that famous editorial:

"Those machines, for example, that you have moved out into the yard to make room for new machines for munition making. Those old machines won't go back into your production line after the war. They will be rusty and obsolete. After-the-war production will require a new tool-up. So into the scrap pile with them.

"Those die sets that you have been carefully preserving in order to accommodate your 1935 and previous customers are in the same category. You can do yourselves and Uncle Sam a favor by chucking them into the scrap pile. The new America that we will build after this war will have no room for old models.

"It takes an order from a 'brass hat' to initiate anything of this kind. That is why I am addressing you big boys particularly. Help yourself and Uncle Sam to some more steel."

hold additional drives until next year.

As an example of the poor returns reported thus far in this drive, the experience of New York is cited. In the drive last year, collections in two boroughs were 19,000 tons, while on Oct. 14 of the present drive, the publicized day of salvage, only 77.2 tons were realized.

Mills to Buy Million Tons Of Scrap for Inventory

... Leaders of the steel industry have pledged to purchase up to 1,000,000 tons of scrap collected in the current scrap drive, according to Robert W. Wolcott, president of Lukens Steel Co. and chairman of the scrap committee of the American Iron and Steel Institute. These purchases will be in addition to the industry's present inventories.

The flow of scrap to the mills is diminishing somewhat, Mr. Wolcott said, and at present is equal to receipts. With steel production running at record breaking levels, the demands of war require that there be no let down in this country's ability to supply the essential military requirements, he emphasized.

Scrap Stocks Decline

Washington

... The WPB Salvage Division reports that shipments of iron and steel scrap during July, 1943, totaled 2,174,000 net tons. This is the lowest monthly total this year — approximately 10 per cent under that of July, 1942. Shipments in July declined in the face of increased consumption and collateral decrease in stocks.

Army to Assist in Salvage Collections

Washington

... Army Service Forces units and installations within the continental United States will take part in the current WPB Salvage campaign to collect scrap metal, War Department has announced. Headquarters of the nine service commands have been di-

rected to cooperate in this drive, which is being conducted in various localities by WPB regional managers.

Army personnel and Army transportation will be utilized only when such activity does not interfere with military duties. However, Army equipment will not be used by private concerns, but by Army personnel in cooperation with local WPB authorities.

Rickenbacker Urges Scrap Drive Support

Washington

... Capt. Eddie Rickenbacker in a letter to H. M. Faust, director of the WPB Salvage Division, said "Having visited all the battlefronts throughout the world, including Russia, it is evident to me that the ever-increasing demand for munition and war weapons will bring about a demand for scrap iron and steel during the balance of 1943 and 1944 unparalleled in the history of any Nation.

"If every man, woman and child over 10 years of age gave only one hour of their time to this salvage drive there would be millions of tons available for the protection of our fighting men."

NAM Presents Views on Tax Increases

Washington

... No increase in taxes, but if Congress insists on additional tax levies then new sources will be necessary, and of these the retail sales tax should be the least damaging to the national economy. These were the views on the Administration's tax proposals, as presented to the Ways and Means Committee on Monday by the National Association of Manufacturers.

NAM's views were presented by J. Cheever Cowdin, chairman of the NAM Committee on Government Finance and chairman of the board of Universal Pictures Corp.

Mr. Cowdin offered figures to show that industry was not being allowed to accumulate adequate reserves.

Some of the figures presented by Mr. Cowdin were at sharp variance with those of the Treasury. For instance, he presented evidence that present laws would produce \$3,000,000,000 more revenue than estimated by the Treasury. Mr. Cowdin said his figures were based on a survey con-

ducted by NAM, which had started on Jan. 1, 1943.

Mr. Knutson, quoting economy figures presented by Rep. Taber (THE IRON AGE, Oct. 16, page 119), said that if 300,000 government employees were struck from the payroll, as suggested by Senator Byrd's committee, a saving of \$600,000,000 could be realized, if the average wage of each was \$2,000 annually.

In his discussion of the retail sales tax, Mr. Cowdin said:

"A sales tax would be 'deflationary', but since it would be an additional burden it could then become inflationary if it would bring about wage increases."

CIO President Philip Murray told the committee last week that the enactment of a Federal retail sales tax would bring about immediate pressure for wage increases.

Mr. Cowdin did not think that big business could absorb all employment after the war, and said for that reason small business would have to be kept solvent, and could not stand an additional tax burden.

Idle Mines Slow Steel Output; Illinois Agreement May Be Confirmed

New York

• • • While the crisis in the current coal strike may pass before the ink is dry on these words no one this week disputes the serious implications of the Alabama and Indiana miners' walkouts on steel production.

Alabama, hardest hit by a walkout of an estimated 22,000 to 25,000 miners was already banking furnaces at the week-end after only three days of coal stoppage. Tennessee Coal, Iron & Railroad Co. was reported to be banking four blast furnaces and taking off from three to five open hearths at Ensley, Ala. Republic Steel Corp. was reported banking two blast furnaces at its Thomas Works and planning to bank a furnace at Gadsden, Ala.

Estimates on the loss of steel production were uncertain but a drop to about 80 per cent in the Birmingham district seemed possible. The five T.C.&I. open hearths are estimated at about 1,000,000 tons annually. The three Republic blast furnaces represent about 2000 tons of iron per day.

Despite pleadings of WLB, commands by John L. Lewis, and exhortations by local unionists, on Monday nearly all of the striking UMW miners remained out of the pits. Their stand was "no contract—no work."

The mines hit by the strike included the Docena, Wylam and Hamilton mines of T.C.&I., employing 4200 men; the Sayreton mines of Republic Steel employing about 1050 men and all the mines of the Sloss-Sheffield Iron & Steel Co. and the Alabama By-Products Co.

Most of Indiana's struck miners totalling only about 3500 were reported slowly returning to work after WLB and Lewis' pleas.

Show-down psychology on the part of Administrator Harold L. Ickes, is seen in his return of the mines to their private operators immediately before the deadline of John L. Lewis' strike truce, Oct. 31. The miners' stand at the time of the truce was that they would work without contract for the government—but not for the private operators. With all mines again in private hands the approaching deadline forces Lewis to take a stand either for or against another strike. So far he has condemned the current walkouts and asked a return to work—without contract.

The juicy plum swinging toward Lewis, and the apparent reason for his present magnanimous attitude, is the promise that the WLB will now hurry to confirm the Illinois miner-

operator agreement granting portal-to-portal pay plus other allowances totalling about \$2.00 more per day. Since this is approximately what the miners first sought and granting of this agreement would set a nationwide pattern, Lewis, by waiting, will get what he fought for without further striking.

No General Coal Strike Expected

Pittsburgh

• • • Reports from the bituminous fields here do not point to a general strike following the expiration of John L. Lewis' strike truce Oct. 31, although an increase in sporadic wild-cat strikes may result. All consideration of striking appears to hinge upon whether the WLB accepts or rejects the Illinois miner-operator agreement which includes portal-to-portal pay and other allowances.

The Illinois agreement would grant the miners about \$2 per day more and, should WLB permit passage, the steel unions are considered almost certain to proclaim this a subterfuge to gain a rate increase and start an immediate drive for higher steel wages. It is believed by some that this factor has been the only one holding CIO-USWA's Murray back from launching an increase drive at an earlier date.

Most observers agree that there

will be no lasting peace or productivity in the coal industry until the wage controversy is settled. Tonnage output per man-day also is not expected to rise until the issue is settled. Another truce could serve to merely extend the period of meager productivity existing in some fields.

Strikes Rob Production

• • • About 1700 workers at Cramp Shipbuilding Co. yards voted to return to work after a three-day walkout disputing management handling. Important Navy contracts were affected.

Employee attendance was reported nearly normal by U. S. Steel's Federal Shipbuilding & Drydock Co. following a three-day strike of about 7000 of the 27,000 employees allegedly protesting dismissal of five shop committeemen. About 80 steel handlers who refused to return will be replaced.

Straws in the Wind as War's Tempo Increases

A VERY substantial number of additional fighter aircraft has been assigned recently to the Southwest Pacific area by the United States and Great Britain, it was revealed Oct. 14 by Australian Foreign Minister H. V. Evatt. The additional planes already are arriving, but so far they represent "only a small installment of what ultimately will be forthcoming," he said.

The new super bombing plane, the B-29, is now in actual production, heralded as the dreadnaught capable of delivering unprecedented blows because of its ability to carry double the load and fighting power of previous giant bombers.

New armor-piercing projectiles designed to rip open Axis planes, tanks and other armored equipment, are now being supplied to U. S. forces, according to Brig. Gen. G. H. Drewry, commanding the Springfield, Mass., ordnance district, who said the achievement represents a smashing production victory.

War expenditures in September represented a decline of 4 per cent from August. It may be that production has reached the peak of capacity, but more importantly the figures represent a change in the war outlook. Since the earlier goals were set, the armed forces have come forward with a number of cut-backs in programs, several cancellations and a great many changes in design. These have been dictated by changes in the war outlook and new requirements.

Planes of the U. S. Army Air Forces destroyed 7,312 enemy planes against a loss of 1,867, from Pearl Harbor to Sept. 1, 1943.

The new "blue goose" incendiary bullet being made in the U. S. for 0.50-cal. machine guns mounted on Allied planes has been described by Air Force officers as one of the deadliest ever made. Containing chemicals, it penetrates self-sealing tanks and fires the fuel.

Sharp cutbacks in output of anti-aircraft and other purely defensive weapons made in the East are reported now being put into effect. At the same time the Army is reported seeking new sources for vehicle parts.



ROLLING BAR in the 12 in. merchant mill at the Pittsburg Works, of Columbia Steel Co., Calif.

Pittsburgh

• • • Substantial increases in the production of various types of steel bars, with the exception of one—concrete bars—is disclosed in a comprehensive study of steel bars produced for sale since 1939.

The impact of the war actually cut concrete bar production this year to a point approximately 58 per cent below the 1939 output and about 73 per cent below the 1941 production for sale. The main reason for this phenomenal drop in the production of a steel item, which before the war constituted about 21 per cent of total bar sales, was limitation orders issued by the WPB, restricting the use of concrete bars in construction work.

This restriction was so severe that concrete bar production for this year will be less than 5 per cent of the total bar production. There are some indications that the restrictions have been eased slightly, but it is not expected that the participation of concrete bars to the total bars sold will be substantial again until after the war.

Contrasted with the decline in concrete bar production has been the phenomenal increase in the output of hot rolled and cold finished alloy steel bars. Hot rolled alloy steel bar production for sale, this year, is expected to be about 270 per cent greater than 1939 output, while cold finished alloy bar sales this year, will be about 585 per cent greater than in 1939. This experience is understandable in view of the tremendous

War Trends in Steel Bar Production Expected to Disappear When Peace Comes

• • •

increase in alloy steel production because of the heavy demand for war materials.

Whether or not alloy steel bars will maintain the relative position they hold today, with respect to carbon steel bars, remains to be seen. Some decline in the proportion of alloy steel bars, compared with carbon steel bars, will occur in the post-war period. However, some sources believe that the substantial increase in electric furnace capacity as well as the refined alloy techniques in open hearths, will mean a greater distribution for alloy steel bars after the war than was the case in pre-war periods.

As would be expected in a war period, merchant hot rolled bar production increased substantially since 1939, and at a faster rate than the grand total for all steel products. Based on estimates for this year, merchant hot rolled bar production for sale will be about 92 per cent greater than in 1939; but the increase in cold finished carbon bars produced for sale will be approximately 193 per cent greater this year than in 1939.

Total bars produced for sale, including all types except hoops and bands, will be about 99 per cent greater this year than in 1939. It is significant, from the war standpoint, that the great increase in plate and bar production has been at the expense of other steel products, at least as far as participation in the total production of all steel products is concerned.

Equally as interesting, as actual bar production figures, is an analysis of the trends in the production of various types of bars. Cold finished

WAR TRENDS IN STEEL BARS PRODUCED FOR SALE

1939-1943 — 000 Omitted

Source American Iron and Steel Inst.—Note: Figures Are Corrected for Shipments to Members of the Industry. This Gives a Net Production for Sale

Year	NET TONS						
	H. R. Merchant	Concrete Billet	Cold Finished Rail	Carbon	H. R.	C. F.	TOTAL
1939	3,221	1,039	175	593	702	67	5,797
1940	4,365	1,299	142	725	963	100	7,594
1941	5,674	1,639	253	1,244	1,621	198	10,629
1942	5,684	1,612	233	1,241	1,849	313	10,932
1943 (8 Mos.)	4,101	288	58	1,171	1,740	317	7,675
1943 EST.	6,156	432	74	1,752	2,616	458	11,488
Increase 1943 Over 1939.	92%	—58%*	—58%*	193%	270%	585%	99%

*Decrease.

carbon bar output for 1939 was slightly more than 10 per cent of total bar production for sale, but during the first eight months of 1943 cold finished carbon bars constituted slightly more than 15 per cent of total bars produced for sale. Showing a greater result of war production was the increase in the percentage of all alloy steel bars to total bars produced, from 13.3 per cent in 1939 to 26.8 per cent so far this year.

Taking up the comparison and the experience of different types of bars with each other during the pre-war period and now, several fundamental changes are disclosed. In 1939, alloy hot rolled bars constituted 91.3 per cent of total alloy bars produced for sale, as against 8.7 per cent alloy cold finished bars. For the first eight months in 1943, the record shows that alloy hot rolled bars are 84.6 per cent of total alloy bar sales, contrasted with 15.4 per cent cold finished.

In making a comparison of hot rolled merchant bars with hot rolled alloy bars, in per cent of total hot rolled bars produced for sale, a substantial growth in the participation of hot rolled alloy bars is reflected. In 1939, about 82 per cent of the hot rolled bars produced for sale were hot rolled merchant carbon bars, and about 18 per cent were alloy. In the first eight months of this year, mer-

chant carbon bars constituted slightly more than 70 per cent of total hot rolled bar sales as against almost 30 per cent for alloy bars.

This relative proportion may not hold after the war, but it is unlikely that hot rolled alloy bars will decline to the position they held in 1939. An exceptional growth in aircraft production, some of which will continue after the war, and the certainty that railroads will, in the post-war period, be greater users of alloy steel, would seem to confirm this opinion.

While merchant carbon and cold finished carbon bar output have both increased substantially since 1939, the participation of cold finished bars has been enhanced due to war requirements. In 1939 cold finished carbon bars accounted for 15.6 per cent of total carbon bars produced for sale, but during the eight months this year their participation climbed to 22.3 per cent of total carbon bars produced for sale. It is problematical if cold finished bars will retain this relative position, in view of the tremendous uses for merchant carbon bars during peace times. Although here again, some of the gain made during the war time may hold over later.

Of interest to both integrated and non-integrated cold finishers, is the

substantial gain made by cold finished alloy bars during the past two years. In 1939, cold finished carbon bars constituted about 90 per cent of the total cold finished bar production for sale, the remaining 10 per cent being cold finished alloy bars. For the first eight months of this year cold finished alloy bars accounted for slightly more than 21 per cent of total cold finished bars as against about 79 per cent cold finished carbon bars.

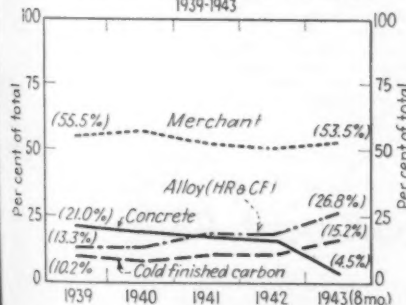
While all of the major steel products greatly utilized in the war have had their production increased substantially during the past two years, it is still notable that the greatest gains in the bar field were made by cold finished carbon bars, cold finished alloy and hot rolled alloy. These products are very desirable ones for those who manufacture them, and it is expected that in the post-war period considerable effort will be spent to maintain as much of the proportionate gain as possible.

In the case of concrete bars, the production of which plummeted from 1941 until in 1943 it was less than 25 per cent of the 1941 output, observers certainly look for a strong comeback in the post-war period. This is believed to be certain in view of the man-made limitation and restriction.

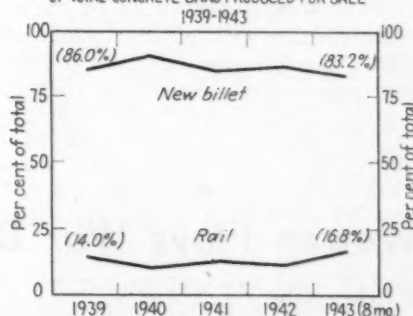
WAR TRENDS IN STEEL BAR PRODUCTION 1939-1943

Source Material: Amer. Iron & Steel Inst. - Compilations: The Iron Age

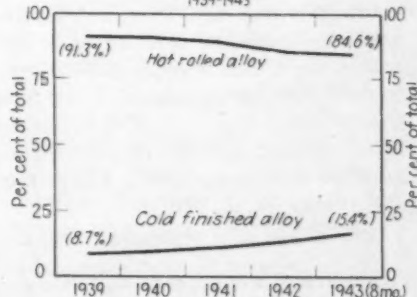
1939-1943
MERCHANT, CONCRETE, COLD FINISHED CARBON, AND ALLOY STEEL BARS IN PER CENT OF TOTAL BARS PRODUCED FOR SALE



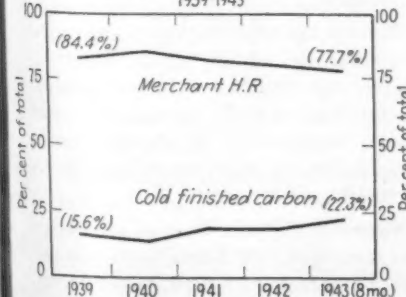
1939-1943
NEW BILLET AND RAIL STEEL CONCRETE BARS IN PER CENT OF TOTAL CONCRETE BARS PRODUCED FOR SALE



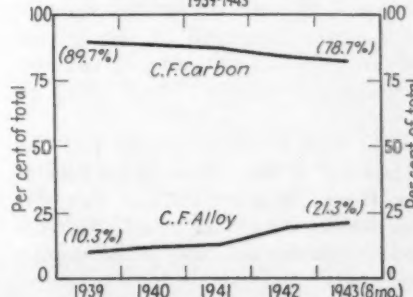
1939-1943
ALLOY HOT ROLLED AND COLD FINISHED BARS IN PER CENT OF TOTAL ALLOY BARS PRODUCED FOR SALE



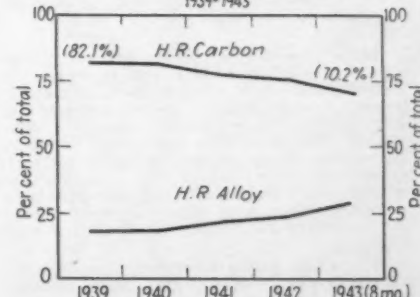
1939-1943
MERCHANT AND COLD FINISHED CARBON BARS IN PER CENT OF TOTAL CARBON BARS PRODUCED FOR SALE



1939-1943
COLD FINISHED CARBON AND ALLOY BARS IN PER CENT OF TOTAL COLD FINISHED BARS PRODUCED FOR SALE



1939-1943
HOT ROLLED (MERCHANT) CARBON AND ALLOY BARS IN PER CENT OF TOTAL HOT ROLLED BARS PRODUCED FOR SALE



... Bitter Fight over Contract Cancellation

Washington

• • • A House Military Affairs subcommittee recommendation that war contractors be paid 75 per cent of the amount owing to them when contracts are terminated was pot-shot last Friday by Undersecretary of War Robert P. Patterson.

Mr. Patterson also opposed the subcommittee's recommendation at the hearing before the full Committee that the General Accounting Office establish a special unit for the review of war agency contract settlements.

Mr. Patterson made it plain that the War Department wanted no outside interference, and that the proposition of paying contractors 75 per cent and of loaning them the remainder owed by the government was not agreeable to the War Department either.

Said Mr. Patterson: "I wholly disagree with the suggestion that prompt settlements are not needed if partial payments or loans are made available. Such tentative payments are no substitute for prompt final determination of what is due.

"Even if the contractor gets substantial partial payments or loans, the remaining amount due may greatly exceed his entire working capital, especially in the case of companies that are greatly over-extended. Accordingly, only a prompt final settlement will fully meet the need in current terminations, or when hostilities end in whole or in part."

On the same day, President Roosevelt announced the creation of a unit within the Office of War Mobilization to deal with the problems of war and post-war adjustment, and that unified programs and policies for government agencies will be developed. (THE IRON AGE, Sept. 30, p. 70)

Mr. Roosevelt's statement follows:

"At my suggestion, Justice Byrnes, director of War Mobilization, yesterday met with the heads of various agencies concerned with the problems of terminating or revising war contracts in light of the changing demands of our war strategy. The War and Navy departments are now in the process of revising more than 8000 contracts involving several billions of dollars.

"It is planned to set up within OWM a unit to deal with war and postwar adjustment problems, and to develop unified programs and policies to be pursued by the various government agencies concerned. The unit will study and consider the whole range of problems which will ultimately arise out of the reconversion of war contracts, including the problems of reconversion and disposition of plants and property no longer required for war use.

"The work has deliberately been placed within OWM to insure that such reshaping

of our war program as may be required will be carried through with a view to increasing the effectiveness of our war effort. While we must prepare for necessary postwar adjustments, this preparation must not interfere with the long hard war programs which are still ahead of us."

While Justice Byrnes has not stopped the feud between the war agencies and GAO, observers say his entrance into the termination picture implies a typical solution calculated to by-pass Congress.

Undersecretary Patterson told the House Committee that procurement agencies should be given legislative authority to negotiate all final settlements of terminated contracts without interference or review by either the General Accounting Office or the courts.

The second main point of Mr. Patterson's statement was that procurement agencies should be empowered to loan money to contractors for financing them in the period between the cancellation of contracts and final settlement. Mr. Patterson said:

"While not opposing such loans, the Comptroller General suggests that they be limited to cases of financial need. The War Department feels that this suggestion reflects a misconception of the purpose of the loans, and that any such limitation on the lending authority would be extremely unfortunate.

"Not only would it create a difficult administrative problem tending to delay all such financing, but it would also tend to retard the resumption of normal operations by many companies, which should promptly have funds to make payments to subcontractors and suppliers in connection

with termination, and to resume civilian production.

"Since these advances and loans would ordinarily represent only part of the amount due directly or indirectly by the government, the size or financial condition would seem to provide no reason for denying it such assistance.

"In the opinion of the War Department adequate financing of termination settlements require at least three types of provision. They are: (1) authority to make advance or part payments to contractors and subcontractors; (2) authority to make direct loans to contractors and subcontractors; and (3) allowance of interest on termination claims to encourage the use of private financing and to equalize the position of contractors who use private financing with those contractors financed by advance payments or guaranteed loans. A revision of H.R. 3022 providing the foregoing has been furnished the House Military Affairs Committee by the War Department."

In support of the War Department's position, Mr. Patterson contended that:

1. War procurement must be flexible to meet constantly shifting battle demands. This means contracts must end for one type of weapon whenever another type is found more effective.

2. Congress should legislate immediately, meeting Army demands. Otherwise, fear of uncertain contract cancellation policy adversely affects war production—"Contractors are reluctant to expand operations or to make extensive commitments ahead."

3. The absence of a uniform and definite policy for the fair and final adjustment of cancelled contracts at the earliest moment consistent with adequate protection of the government interest, deprives business and labor of assurance of successful conversion to civilian production.

• • •

Warren Flays War Department Policy

Washington

• • • A sizzling denunciation of the War Department and all its financial policies by Comptroller General Lindsay C. Warren on Monday brought to a sharp focus all of the private official bickering surrounding contract termination which has been going on for months.

Mr. Warren, who plainly had the sympathy of his former colleagues of the House Military Affairs Committee, was in a fighting mood. He told the committee it was their public duty to:

(1) pass a resolution stopping all war contracting agencies from settling terminated contracts and from inserting termination clauses in future contracts, and (2) to pass a contract termination law as quickly as possible which would be equally fair to contractors and to the government.

The Comptroller General said that the attitude of Army contracting officers was "To hell with the General Accounting Office!" He declared that GAO's experience in dealing with them proved a very great number to be "inefficient."

Moreover, Mr. Warren reported that on Sept. 20 Undersecretary of War Patterson had sent him a letter

Policies Breaks Out in Washington . . .

saying that the Comptroller General has no authority to disapprove erroneous payments of contracting officers.

"He objects to the disallowances we have made, no matter how far a contracting officer goes beyond his authority," snapped Mr. Warren.

Mr. Warren charged that contracting officers are constantly fraternizing with contractors who entertain, "wine and dine them."

Mr. Warren said that he was

For additional comment see Washington column on page 68.

amazed and astounded at the Army regulation governing termination.

"It has an appearance of being put forward by special pleaders for industry," the Comptroller declared. "It is an encouragement to extreme generosity, collusion and fraud with little or no chance in the future to detect these things."

Mr. Warren said that PR-15 was a "grand cover-up," and that since the regulations preclude chance to detect frauds, that no doubt they would be used to cover up frauds.

Contracting officers under this procedure can wipe out all of the work GAO has done since it existed, all suspensions, collections, awards by courts, Mr. Warren contended. He added that the effect of renegotiation would be wiped out, and the chance of unjust enrichment would be ever-present.

Mr. Warren said that he had watched a "scandalous waste of the public substance" for over two years in the examination of contracting officers accounts on cost-plus-a-fixed-fee contracts.

To illustrate to the committee his reasons for objecting to PR-15 procedure which reposes all and conclusive discretion with contracting officers in settlement, Mr. Warren cited a great number of instances where if it had not been for GAO vigilance, he said, Army contracting officers would have succeeded in charging the government for improper costs incurred by cost-plus-fixed-fee contractors.

The Comptroller cited a whole group of what he claimed were improper charges against the government. Some of these were: Flowers for funerals; transportation of a dog

War Department Arguments Summarized

Washington

• • • War Department arguments against contract termination settlements being reviewed by the General Accounting Office were presented to the House Military Affairs Committee on Oct. 15.

They are:

1. GAO has no legal power to review procurement agencies' settlements, but since the Comptroller General has asserted this right, Congress should settle the question.
2. Contract settlements made during the war are an integral part of the procurement process. Terminations are often made to secure a plant for other work. New contracts must be entered into; inventories must be shifted. Speed in execution of settlements is essential to contractor's financing of new contracts. (Note: No reason is given for procurement agencies controlling post-war settlements.)
3. The procurement agencies are in process of developing uniform termination regulations.
4. Negotiated settlements by the procurement agencies protects the government's interest, and has the virtue of speed. A real post-audit by GAO would not be feasible unless the original settlement was based on detailed auditing.
5. Any figure for contractors' costs is an approximation and in arriving at it, many questions must be decided on the basis of sound business judgment, not mechanical auditing.
6. The problems of allocating employees' time and material inventories to different contracts, and costs of partly completed work, involve assumptions and are matters of judgment which can only be exercised by procurement agencies.
7. The prospect of GAO post-audit would paralyze the original negotiations, and would make both the contractor and the fiscal officer take the risk that GAO might reverse the decisions, and claim refund of payments made under the negotiation.
8. If procurement agency decisions are not final, concessions made by the contractor in negotiation would be treated undoubtedly binding while the government would be free to revoke offsetting concessions made by it.
9. This uncertainty would make a contractor unwilling to act at his peril in selling materials and work in progress, or in settling with subcontractors if negotiation with the agency is not final. The contractor would more than likely await GAO's decision. This would delay disposition of inventories, and impede the undertaking of new production.
10. GAO review and reopening would impose on the settling agency the responsibility for making settlement without authority necessary to do so. Such an arrangement cannot be tolerated and would seriously impede settlements.

and of the pregnant wife of a contractor's employee; group insurance; vitamin pills; a chauffeur's license; juke boxes; barbecue; and personal telephone and telegraph calls.

It was sought, Mr. Warren said, to charge a spare set of false teeth costing \$225 against the government by a contractor whose employee was being sent to Russia. Other suspended payments listed by Mr. Warren were: Free meals to government employees and their guests—the government collected \$78,000 as a result of GAO stopping this practice.

An aircraft manufacturer who was furnished \$1,100,000 worth of government owned components billed the government for the planes, it was charged, and did not deduct the value of government owned material.

Mr. Warren cited three cases where contracting officers approved claims for reimbursement by contractors whose steel suppliers had voluntarily reduced the price on the products, but the contractors failed to take advantage of the reduction. Recoveries of \$58,000, \$574,000, and \$600,000 were made.

Contract Ending Studied By Senate Committee

Washington

• • • Senator James E. Murray, Democrat of Montana and chairman of the Senate Small Business Committee, has stated the purposes of contract termination legislation to be considered by the committee in its hearings which began Oct. 15.

Sen. Murray explained that the major legislative aims of the committee were: Speedy final settlement of terminated war contracts; quick temporary financing for manufacturers who need cash in advance of final settlement; uniformity of policy and procedure among the various government agencies; and statutory guarantees that the rights of smaller manufacturers will be protected.

Close attention will also be paid to the manner in which a procurement agency decides to terminate contracts of contractors in various areas in relationship to the problem of getting manpower, machinery and materials back into production after termination and to whether dismissal wages should be included in termination costs.

Machine Tool Drop Is Being Cushioned; Builders Told in Session

Chicago

• • • Like the bear, America's machine tool industry went over the mountain—early this year as far as machine tool production is concerned—but with military weapons yet to be produced the traditional period of hibernation is a long way off, agreed nearly 400 members of the National Machine Tool Builders' Association meeting last week in Chicago for the Association's forty-second—and largest—annual meeting.

Shipments of machine tools in 1944 probably will drop below \$400 million, John S. Chafee, WPB tools division director, estimated. Walter W. Tangeman, president of the Association and vice-president of the Cincinnati Milling Machine Co., placed 1944 requirements at \$325 million, or one-fourth of peak output.

Although Mr. Tangeman acknowledged that because of the changing requirements of war "we will not be able to escape a continuing flow of cancellations," it was acknowledged that the production decline would not be entirely precipitous. Replies to a WPB conversion questionnaire quoted by Mr. Chafee showed that 228 companies responsible for 88 per cent of August shipments together held a machine tool backlog of about \$350 million. Only 47 per cent of the companies replying reported any conversion to manufacture of other types of equipment, but these companies already had acquired a backlog of \$94 million.

Strangely, this questionnaire showed that the smaller companies are acquiring a larger proportion of

non-machine tool business than the medium and larger sized builders. Those having monthly shipments of less than \$250,000—12 per cent of those reporting in August hold 40 per cent of the backlog for other than machine tools. Twenty-seven per cent of all small companies have converted to the extent of 30 per cent or more of capacity. By value of August shipments, 83 per cent of the maximum machine tool capacity of reporting companies still was devoted to machine tools.

Some of the non-machine tool products now being manufactured by the industry now include, according to Mr. Chafee, aircraft and aircraft engine assemblies; propellers and parts; steam engine parts; bomb parts; aircraft torpedoes; hydraulic cylinders and pistons; power drives for tanks; gears and assemblies; etc.

The problem of conversion to non-machine tool manufacture was acknowledged to be a difficult one. As Mr. Tangeman asked, "Just what share of the capacity of our plant must be reserved for machine tool manufacture?"

He expressed the hope that a plan involving the participation of the WPB in determining the number of (CONTINUED ON PAGE 144)

Farm Equipment Makers Warn of Crisis

Chicago

• • • Breaking precedent to speak from the floor of a meeting sponsored by the National Retail Farm Equipment Association, officials of two major farm equipment manufacturers last week warned that unless the raw material and component parts situation was rectified, fewer farm machines would be produced for the 1944 crop season than were available in the year ending June 30, 1943.

This warning voiced by George L. Gillette, vice-president of the Minneapolis-Moline Power Implement Co. P. H. Noland, executive vice-president of the B. F. Avery Co., confirmed the critical materials situation, first unearthed in a survey of principal manufacturers made by THE IRON AGE and reported in the Sept. 30 issue.

The manufacturers pointed out that if important components were not

available, adequacy of supply of other materials and parts going into farm machines, was irrelevant. Further, they declared that CMP allocations, as currently administered constituted no more than a "hunting license." It was urged that the National Retail Farm Equipment Association appeal to the Truman committee to investigate the entire farm equipment production program if necessary to prevent possible collapse of production schedules.

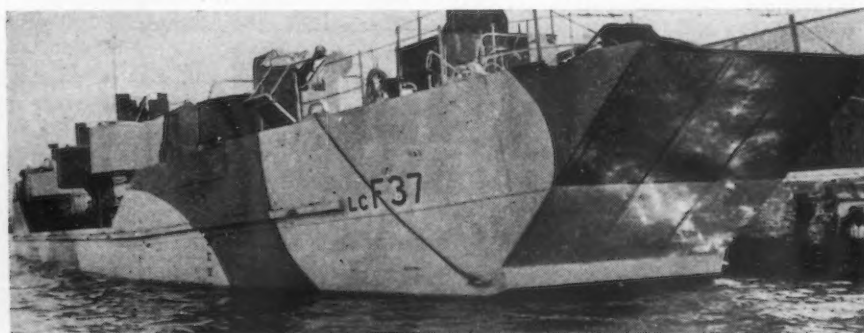
The unscheduled warning from the floor of the meeting came after assembled dealers had heard lukewarm assurances from M. Lee Marshall, War Food Administration official responsible for obtaining materials for making equipment and supplies necessary to produce and process food, that "the situation for 1944 is much improved." He pointed out that a considerable amount of machinery authorized for 1943 was not produced in time for use this year and would be available in 1944.

It is understood that the tempest stirred up by airing of the situation in THE IRON AGE and on the convention floor resulted in a meeting held the latter part of last week in Washington to discuss the situation.

M. M. Smith, chairman of the Association committee on postwar planning, revealed that Herbert H. Lehman, director of the Office of Foreign Relief and Rehabilitation, had personally appeared before the WPB requirements committee to request more steel for manufacture of farm machinery for export to Italy.

NEWEST CONTRIBUTION to the invasion craft designed by the Allies is this landing craft (Flak) of the Royal Navy. It furnishes protection against air attack for other landing craft during invasion operations.

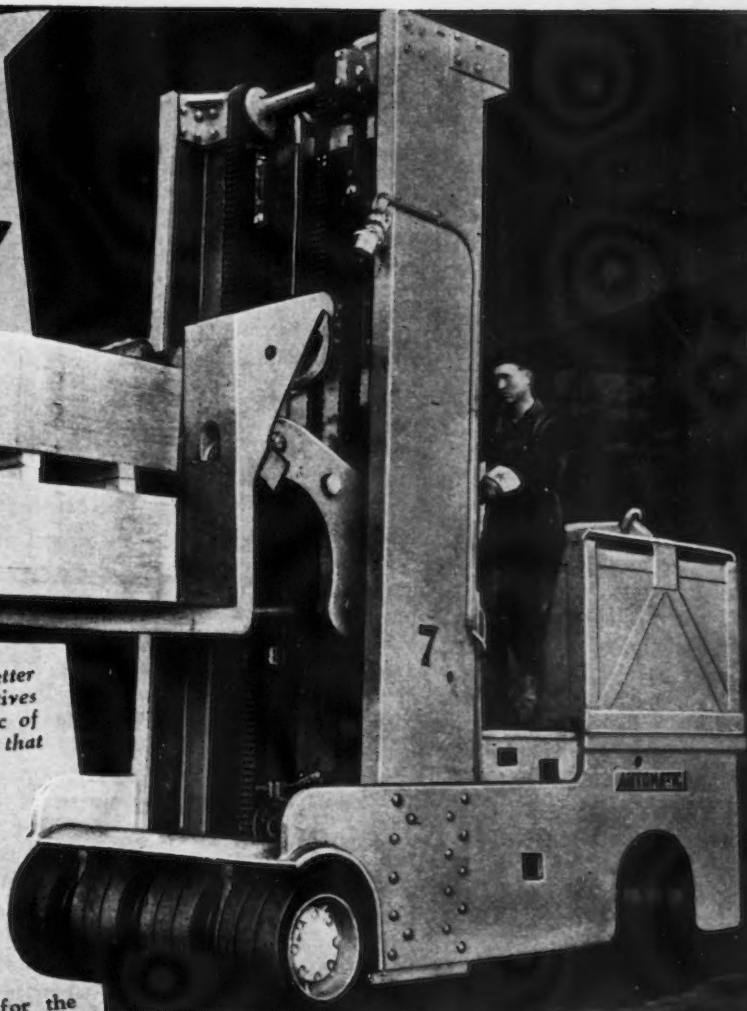
International News Photo



ALL OF US ARE
WORKING FOR
A QUICK
Victory

● The following excerpt is from a letter received by one of our representatives from an old customer. It is symbolic of the "cooperation for victory" spirit that characterizes American Industry.

"We have your letter of June 23rd in regard to an electric truck and, as a matter of information, we are continuing to buy service parts from the Automatic Transportation Company, Chicago, Illinois, and the old truck which we thought was worn out 18 months ago is still in service. It looks as though it might last for the duration. We suppose that after the war you will be able to make shipment of the order which we have placed with you. As soon as you are able to do anything in regard to a new truck, let us know."



TRADE **AUTOMATIC** MARK

★ You in your way — we in ours — are extending ourselves to the limit to shorten the road to victory.

It is obvious that materials handling is a most important part of the war effort and to us is assigned the task of getting materials handling equipment to those places where it will do the most good.

Naturally we regret the situation that makes it necessary for so many of our customers of long standing to be denied new "AUTOMATICS" for the present. Yet, all of us are happy to cooperate in our own way for in this united action comes victory

One of these days there will come an end to the "for the duration" period and "AUTOMATICS" will again be available. Meanwhile, since we are "all out for war production" and your victory efforts too are being contributed — keep your "AUTOMATICS" going to keep materials flowing.

AUTOMATIC TRANSPORTATION COMPANY

Div. of the Yale & Towne Mfg. Co.

75 W. 87th ST.

CHICAGO 20, ILLINOIS



MANUFACTURERS FOR OVER THIRTY FIVE YEARS *Electric Propelled* INDUSTRIAL TRUCKS

AISC Predicts Busy Decade of Building

Rye, N. Y.

• • • America must "begin to visualize the post-war problem, not as an excursion into the realm of fancy, but as one demanding an immediate survey of peacetime needs" was the view expressed by Clyde G. Conley, president of the American Institute of Steel Construction, in his annual convention address here last Tuesday.

The F. W. Dodge report has estimated, Mr. Conley said, "that the average construction volume in the ten years following the war's end will exceed the annual volume of any previous decade." Stressing the ability of the steel fabricating industry to meet all expected needs, Mr. Conley pointed out that despite the industry's capacity of 4,800,000 tons as estimated by the Department of Commerce in 1929, the industry was called upon during 1941 to fabricate only 2,296,954 tons—with 1941 being the peak year of the entire period beginning with 1931.

Needed in the post-war period, said Mr. Conley, will be construction for "public works, utilities and railroads, institutional buildings, plant facilities for consumers' goods, and multiple housing dwellings." In addition, it was his view that foreign countries will have even greater need for such construction. "Those countries which have been in the actual fighting zone

will of necessity require a rehabilitation of public and industrial facilities."

Foreseeing a bright future for the steel fabricating industry, Mr. Conley declared: "While these demands will bring novel problems of engineering and production, the lessons which your recent changes in production methods have taught you should be of material assistance."

Post-War Construction Contracts Now Being Let

Cleveland

• • • F. W. Dodge Corp., construction analysts, pointed out in a recent publication, *Blue Prints for V-Day*, the inevitability of a building boom of an industrial nature when the war is over.

Already there have been concrete indications that industrial construction will go into an upswing. George A. Bryant, president, the Austin Co., Cleveland, stated recently that, while construction of war plants during the third quarter of 1943 fell off, a substantial number of contracts for industrial plant construction were signed during this period for work to begin as soon as materials are available. Likewise, H. K. Ferguson Co., Cleveland, has a number of newly

signed contracts for plant expansion in the packaged food, chemical industries and other industries. The Arthur G. McKee Co., oil refinery and metal working plant contractors, indicated that construction of these types of plants will carry on after the war both here and abroad.

Pittsburgh Firms Built Good Part of New Geneva Steel Mill

Pittsburgh

• • • Many Pittsburgh firms participated in the construction of the Geneva Steel Co. at Geneva, Utah, according to the *United States Steel News*, whose October issue devoted substantial space to the details and description of a new DPC plant.

American Bridge Co., a U. S. Steel subsidiary, constructed the open hearth and mill buildings. The nine 225-ton open hearth furnaces were built by Amsler-Morton Co., which also furnished the soaking pits. Koppers Co. supplied the 252 by-product coke ovens.

United Engineering and Foundry Co. is supplying the 45-in. slabbing and blooming mill, and the 132-in. continuous plate mill was built by the Mesta Machine Co.

Slab reheating furnaces were constructed by Rust Engineering Co. The following companies shared in the construction of the 26-in. structural mill; Morgan Engineering Co., Alliance, Ohio, and Birdsboro Steel Foundry and Machine Co., Birdsboro, Pa.

Westinghouse, General Electric and Allis-Chalmers participated in furnishing the electrical equipment.

The new steel plant, which is to be operated by U. S. Steel as an agent for the DPC, is rapidly nearing completion.

Senate to Study Iron And Steel Mill Locations

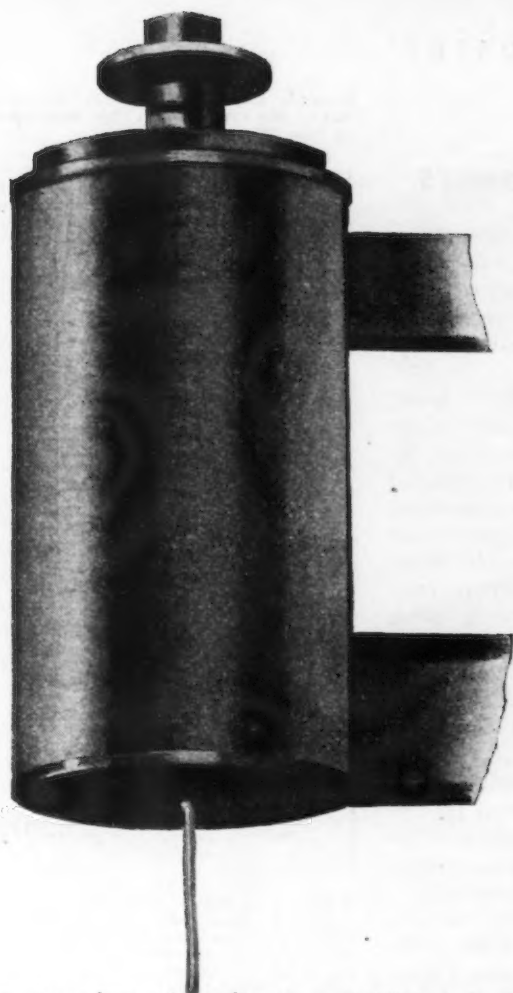
Washington

• • • A resolution was introduced in the Senate last week by Senator Pat McCarran, Democrat of Nevada, for the appointment of seven senators to make an investigation of the effect upon interstate commerce of the centralization of heavy industry.

The Nevada senator wants "to make a comprehensive study of plans and proposals for industrial decentralization, particularly through establishment of new or expanded facilities for the production of iron and steel."

ELECTRONIC FATIGUE TESTER: Energized by powerful electronic equipment, this new type of fatigue tester vibrates the metal sample up and down about 10 million times in 5 hr. This special unit shown in use in the general engineering laboratory of General Electric Co. has a range from 30 to 20,000 cycles per sec., far greater than any mechanical type of fatigue tester, thereby enabling greatly accelerated tests to be made.





Danger! **CORDITE**

—and how Hele-Shaw Fluid Power Engineers tamed it

The extrusion of cordite is a ticklish job. Every conceivable precaution must be exercised to protect life and property.

Our engineers were asked to cooperate. Because of the safety factors there were many complications.

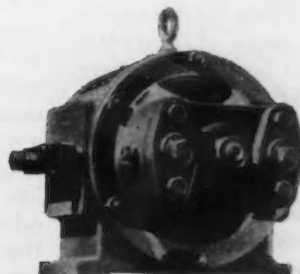
It was desirable, for example, to bring the ram down to the plug quickly to avoid wasting time. However, once the ram neared the cordite plug it had to stop, proceed automatically, and contact the plug without shock. There was still another condition. Once contact had been made, speed of extrusion and pressure had to be automatically con-

trolled, depending on the consistency of the plug.

After conferences with the manufacturer, we designed and furnished the entire pumping unit and oil circuit, including Hele-Shaw Fluid Power pumps and special controls.

Your post-war thinking may lack the drama of a cordite extruder, but offer equally baffling problems in improving a product or process, or in simplifying control or operation of a machine. If you have an idea Hele-Shaw Fluid Power or Hele-Shaw engineers can help you in your post-war planning, you are invited to write for further assistance.

THE
Hele-Shaw
Fluid Power Pump



OTHER A-E-CO PRODUCTS: TAYLOR STOKERS,
MARINE DECK AUXILIARIES, LO-HED HOISTS

AMERICAN ENGINEERING COMPANY

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WPB Paper Work Reduction Cuts 4-B Applications; Adds Regional Powers

Washington

• • • Thousands of application forms, formerly routed to the WPB in Washington, will now be processed in the field as a result of specific measures announced by operations vice-chairman, H. G. Batcheller, to implement the decentralization policy announced.

Mr. Batcheller revealed a reduction in CMP paper work which will have the result, after the first quarter of 1944, of eliminating two out of every three CMP 4-B quarterly applications, with authorizations made on an annual basis.

Specifically, these are the changes in regional handling of WPB applications, according to a Reliance Steel Corp. bulletin.

On Oct. 15, the field offices were scheduled to begin processing applications up to \$10,000 in value (excepting certain types of projects), and this authority is to be increased to cases of \$25,000 in value or less beginning Jan. 15, 1944.

The field offices now process PD-333S up to a value of \$500. This is to be increased to \$1,000 within 30 days, and to \$2,500 within 60 days. The authority to grant emergency AAA ratings, however, will remain with the Washington offices for the time being.

At the present time, the field offices handle appeals under 60 WPB "L" and "M" orders, and are permitted only to deny such appeals, or to recommend approval, they are not permitted to make outright grants on

appeals. Within the next few weeks, 136 addition orders will be referred to the field, with action limited as above on 66 orders and limited to recommendations for denial or approval on the other 70 orders.

The action to reduce CMP paper work was taken after a study of the 4-B applications for carbon steel, received quarterly by WPB, revealed that 80 per cent of the applications represented a demand for only 5 per cent of the carbon steel supply. Ninety-five per cent of the carbon steel supply allocated on 4-B's in other words, has been allocated on 20 per cent of the applications. Studies now being made of copper and aluminum 4-B's indicate that much the same picture exists.

These studies made it clear that it is possible to have a different type of control on a substantial portion of the 4-B applications without endangering the supply of controlled materials.

Each WPB Industry Division has surveyed its records of CMP 4-B's with the purpose of determining what portion of applications for small amounts of material could be authorized for a period longer than three months. The divisions found that after the first quarter of 1944, about two-thirds of their 4-B authorizations could be handled on a yearly basis.

• • •

Aluminum Acceptance, Delivery Modified

Washington

• • • Rules governing acceptance and delivery of orders for aluminum products in the form of controlled materials, except ingot, have been modified in a WPB amendment to Direction 23, CMP Regulation 1, to reflect changes in procedure.

Following receipt of an order for such products which a producer cannot fill in the month requested, the producer must notify the customer as promptly as possible, and in any event, within seven days of the proposed delivery date. The customer then has seven days within which to place written confirmation of the new delivery date in the hands of the producer. If the customer does not confirm the new delivery date

within the allotted time period, the producer must cancel the order.

In such cases, when the new delivery date falls within a later quarter than that shown on the original order, and the order is an authorized controlled material order rather than a specially directed AM (Aluminum Magnesium) order, the confirmation has no effect until the producer receives the customer's certification that he has an allotment available for the new quarter. In this event, the customer must charge the order against the allotment for the new quarter. Confirmation or certification may be made either by letter or telegram.

When a producer of aluminum product has no open capacity, either in the delivery month or the two following months, he must reject the order as promptly as

possible and in any event within seven days. He must notify his customer that he has done so.

If, after final acceptance of an order for aluminum products, a producer finds that he cannot make delivery during the month in which delivery was promised, the order must nevertheless be given a position on his production schedule and be filled ahead of all orders accepted for delivery in any month after the promised delivery month, unless otherwise directed by WPB or the customers.

Vise Order Delayed

Washington

• • • The effective date of Schedule VI of Limitation Order L-216, which was originally issued Sept. 7, and reduced the number of types of sizes of vises which could be manufactured from approximately 165 to about 40, was postponed last week until Jan. 1, 1944, by WPB.

Additional CMP Developments

• Dir. 4 to Reg. 3 rules that a distributor, placing a rated order with a manufacturer, calling for direct delivery to the distributor's customer, must identify such rated order with the customer's allotment number, if any. (Release No. WPB-4408)

• Dir. 18 to Reg. 1 has been revoked. (Release No. WPB-4408-A)

• Dir. 16 to Reg. 1 rules that if a steel producer has shipped a replacement order for steel rejected by a customer for failure to meet specifications, or for other defects, and it develops that the rejection was improper, the customer must either return the replacement material or furnish the producer with the necessary certification and charge the proper allotment. (Release No. WPB-4406)

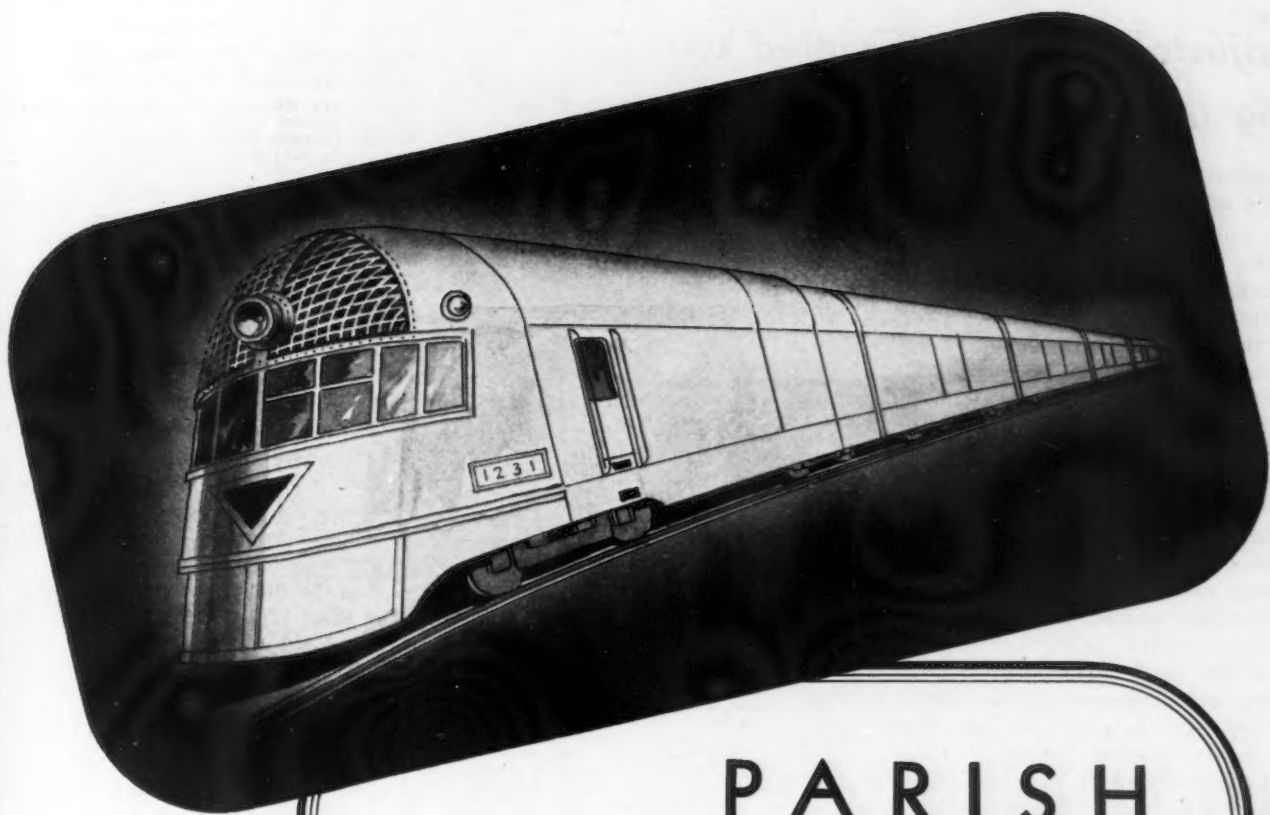
• Dir. 23 to Reg. 1, as amended, modifies rules governing acceptance and delivery of orders for aluminum products in the form of controlled materials (except ingot) to reflect changes in procedure recently included in Reg. 1. (Release No. WPB-4425)

• Dir. 5 to Reg. 3 rules that producers of certain automotive replacement parts must not use preference ratings assigned to their authorized production schedules covering such parts, to buy replacement parts for resale as such. (Release No. WPB-4434)

Price Briefs

• Amdt. 1 to MPR 377 continues the requirements of companies having deliveries of less than \$100,000 of die castings (including dies) to file quarterly-yearly reports of deliveries.

• Amdt. 8 to RPS 10 authorizes adjustable pricing provisions (the standard type being inserted in almost all OPA regulations) for use in all sales of pig iron and also in sales of iron ore produced in Minnesota, Wisconsin and Michigan. (Release No. OPA-3294)



PARISH STAMPINGS

The railroads of the country have proved themselves miracle workers in the transport of war goods. An equally remarkable accomplishment is heralded for the post-war economy.

Soon to be on the drafting board are designs for rolling stock that will make possible transportation of passengers and freight at the lowest per mile cost ever known.

Steel, as always, will be the basic element in this further advance; for steel, properly alloyed, or properly surface protected, provides resistance to the elements beyond that accomplished by any other material.

Steel also provides resistance to fatigue, to shock, to temperature changes, that is bound to make it the reliance of the future just as it has been of the recent past.

Pressed Metal Parts and stampings will be used by the railroads, and by numerous other industries of the country because of their low cost, their broad range physical characteristics, their aid in the creation of beauty, and for their other well known qualities that has called for the tonnage in the past.

Parish Pressed Steel engineers will be found cooperative and helpful. Why not, call on us while your plans are in the preliminary stage.

★
**METAL
STAMPINGS**

★
**MODERN
DESIGN
AT LOW COST**



PARISH PRESSED STEEL CO., Reading, Pa.
Subsidiary of SPICER MFG. CORP.

Western Representative F. Somers Peterson, 57 California St., San Francisco, Cal.



Adjustable Pricing Granted on Pig Iron, Ore; Differentials Increased

Washington

••• Effective Oct. 22 all sales of pig iron and sales of iron ore produced in Minnesota, Wisconsin and Michigan will be brought under adjustable pricing provisions of OPA regulations. This was announced last Friday. Though the announcement was made as OPA was preparing to issue adjusted lake ore prices, it was stated that the bringing of all pig iron sales and ore sales in the three chief producing states under the adjustable price provisions made no change in prices established but merely clarify OPA provisions and add others to facilitate administration.

At the same time, OPA boosted silicon and manganese differentials on pig iron by 50c a ton for each 0.25 per cent or portion thereof of silicon content in excess of the base grade, 1.75 to 2.25 per cent and for each

0.50 per cent or portion thereof of manganese content in excess of 1 per cent.

These changes were made in amendments to the ore and pig iron schedules.

Under the new provisions any person may agree to sell at a price which may be increased up to the maximum price in effect at the time of delivery. But no person may, unless given OPA authorization, deliver or agree to deliver at prices to be adjusted upward in accordance with action taken by OPA after delivery. As is made clear in the amendments, such authorization leaves wide discretion with OPA. Authorization may be given when a request for a change in the applicable maximum price is pending but "only if the authorization is necessary to promote distribution or production and if it will not interfere with the purposes of the Emergency Control Act of 1942." The purpose of that law is to control prices and thereby prevent inflation.

Authorization for upward adjustment of prices may be given by the Administrator or by any OPA official to whom such power has been delegated. The authorization will be given by letter or telegram when the contemplated revision might be the granting of an individual application for adjustment.

Bell Moves Producing Plant in 21 Days

Burlington, Vt.

••• The transfer of the Bell Aircraft Corp.'s ordnance division from Buffalo, to a remodeled cotton mill at Burlington, Vt., was completed in 21 days after the change started on Aug. 20. By the middle of November, according to Carl F. Lozon, general manager of the plant, production will be up to schedule.

By careful planning, the only lost time in production on the machines was during knockdown, shipping, and reassembly, which in most instances was less than a week. Production continued at Buffalo until equipment had to be moved, and then as quickly as it could be set up at Burlington, it was back in production. While machinery was enroute other machines of the same general type remained in operation at Buffalo. Control of production remained in Buffalo until the number of machines at Burlington had overwhelmed the Buffalo operation, and then control was shifted to Burlington.

Likewise, personnel and raw stock were shifted quickly to Vermont. Gun mounts, the principal product of the division, were machined in Buffalo and then shipped to Vermont for assembly. Gradually, the machining shifted to Burlington as machinery and stock was transferred. By the end of Sep-

tember, records showed that Vermont production was just about 30 per cent off normal.

At present, the working schedule at Burlington is set at two 10-hr. shifts daily, and about 1600 are now employed. By next summer employment is expected to be up to 3000.

Gov't. Starts Damage Suit Against C-I on Plate Charges

Pittsburgh

••• The federal government last week instituted a civil action against the Carnegie-Illinois Steel Corp., its sales agency, and nine individual employees, in connection with an investigation some months ago into physical tests made on plates at the company's Irvin Works.

The bill of complaint set forth claims of \$2,000 for each individual act of alleged misrepresentation on the quality of the plates. In addition, the suit asks for double the amount of any damages the government might have sustained as a result of the alleged falsification of records. No specified damage was mentioned in the bill of complaint.

The government makes no claim in its suit that the plates were not suitable for the purpose for which they

were made, but does maintain that the defendants had knowledge that the plates were not in accordance with rigid government specifications, when claims for payment were entered.

Last June, in a criminal conspiracy case, the corporation and the general superintendent of the Irvin Works were indicted by the grand jury. Ten other officers and employees were then named as "co-conspirators" but not as defendants, and were not indicted.

C-I Sets New Marks

••• In addition to eight new monthly unit production records, the men and women of Carnegie-Illinois Steel Corp. set a new high average of more than 47,000 tons daily for blast furnace production in September. Homestead Steel Works broke a 15-year-old record for total production of steel ingots.

Writer Confused by Heat

••• On page 103 of the Oct. 7 issue in a story from Pittsburgh on wire rope it was said that one heat of steel from a single large furnace would provide most of the steel necessary to make 200,000 to 230,000 tons of wire rope. This should have been one thousand tappings from one large furnace would provide the steel. The furnaces at the two plants mentioned run about 200 to 225 tons per tapping.

Priority Changes

L-6—Amended order liberalizes the use of copper for domestic washing machine parts. (10-15-43)

L-42—Sched. V, revised, permits the use of steel in overflow pipe for flush valves in plumbing fixtures and withdraws permission to use plastics for this purpose. (10-11-43)

L-117—Revoked. (10-11-43)

L-158—Amended order updates preference orders for certain truck replacement parts from AA-2X to AA-1 for production and distribution of these items. (10-11-43)

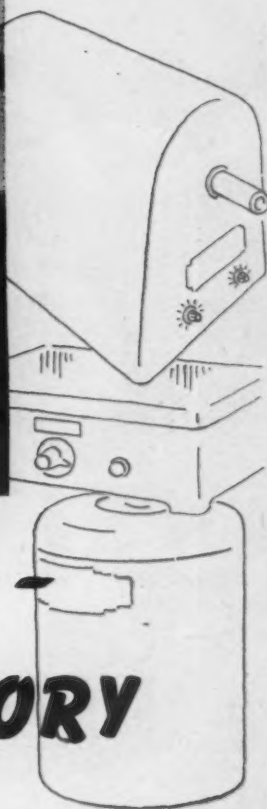
L-216—Effective date of Sched. VI has been postponed to Jan. 1, 1944. (10-13-43)

L-236—Schedule III simplifies production of marine fittings hardware. (10-14-43)

L-292—Sched. III establishes production quotas for canning machinery and equipment based on WFA requirements. (10-16-43)

M-76—Revoked. (10-11-43)

M-293—Amended order makes Class Z product scheduling provisions available to essential Canadian war programs. (10-13-43)



Performance plus -- FOR YOUR LABORATORY

WHEN it's a question of performance, discriminating laboratory technicians will want to benefit by the results obtainable with the new Lindberg Box Type Laboratory Furnace. Ash determinations, fusions, ignitions, drying precipitates, heat treating small parts and many other operations, are efficiently and accurately handled by this single unit.

Careful design and durable construction, as well as appearance, add that certain "plus" for which all Lindberg equipment is widely known. Let's look over these important features.

Appearance

- Streamlined and clean. Adds to modern laboratory standards.

Construction

- Rugged. Heavy sheet metal housing encloses courses of selected high temperature insulating slabs and refractory brick.
- Vertical lift mechanism raises door so that hot side is always facing away from operator.
- A convenient ledge is revealed when door is open.
- Heavy rod type low voltage nickel chromium elements. Excellent for temperatures up to 2000°F. Long life, few replacements.
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- Lindberg Input Control accurately provides "stepless" apportioning of heat.
- Indicating pyrometer registers the temperature throughout the range of furnace applications.

- Index pointer on pyrometer gives visual check on furnace control.
- Signal light shows when furnace is in operation.

Two Sizes

- Temperature range up to 2000°F maximum.

CHAMBER SIZES

B-2 4½" wide x 10" deep x 4" high

B-6 7½" wide x 14" deep x 5½" high

Other "performance plus" equipment are the Combustion Tube and Crucible type furnaces as well as the corrosion resisting Hot Plates, all available in convenient laboratory sizes. See your usual laboratory equipment dealer—he will gladly give you further information and prices.

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**ESPECIALLY
 DESIGNED
 FOR EACH JOB . . .**

PRECISION

OUR business has always been the making of bolts, studs and nuts to specifications with emphasis on the specials. Our customers are legion; 25 pieces here, a hundred there, and thousands for that special refinery-synthetic plant.

Today your Boss is our Boss and when we ask old customers to be patient, they know what we mean. We are working 100%, day and night, on vital war work, which as you know is scheduled by Uncle Sam with the one thought of winning the war, not of winning or holding good will. That part of business is reserved for peacetime.

SPEED THE DAY OF VICTORY—BUY BONDS



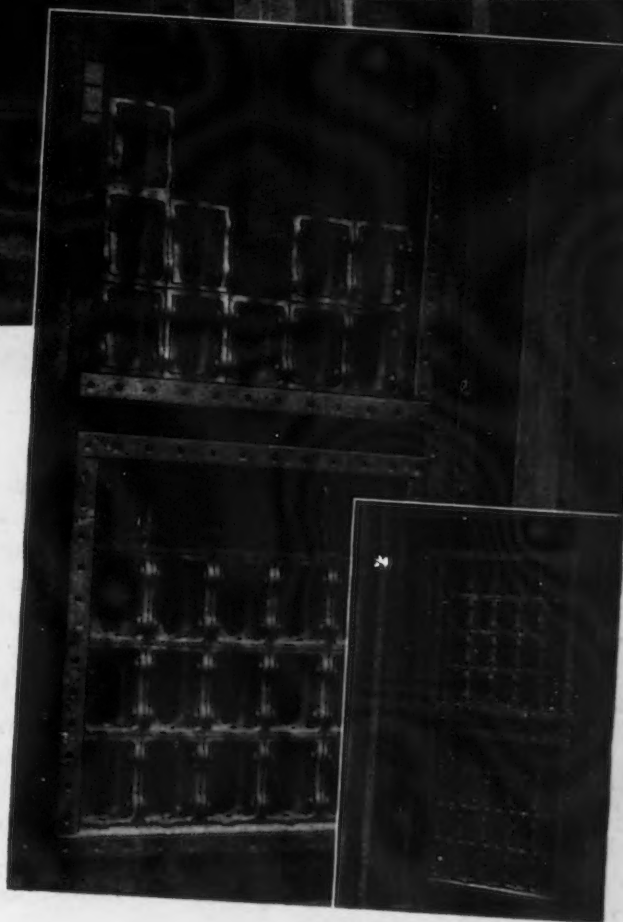
New WPB Forms

- WPB-202—Non-ferrous scrap metal. Dealers' report for October.
 WPB-3202—Non-ferrous scrap metal. Dealers' monthly report.
 WPB-1771—Ship steers. Delivery schedule.
 WPB-1510—Low pressure cast iron boilers (steam or hot water). Manufacturers' report on shipments, inventory, production and repair parts. Monthly.
 WPB-3212—Refined copper. Refinery report of production and inventories. Monthly.
 WPB-2798—Office machinery. Application to purchase or rent, or to export sets of parts thereof.
 WPB-2830—Resistance welding machinery. Manufacturers' monthly report on shipments and orders.
 WPB-2009—Measuring and testing tools and instruments: Manufacturers' monthly report of orders and shipments.
 WPB-2002—Application for authorization to dispose of used locomotives under Order L-97 amended.
 WPB-1475—Critical heat exchangers: Application for authorization to purchase.
 WPB-3286—Abrasive products: Producer's monthly report of production, sales and related statistics.
 WPB-1826—Production schedule main marine propulsion turbines and gears.
 WPB-2950—High pressure blowers (20 h.p. and above) production record card.
 WPB-1865—Section B: Production of new machines during month and production schedule as of end of month.
 WPB-2581—New scales, balances, attachments or weights: Application for preference rating to purchase or rent.
 WPB-2476—Aluminum products: Cumulative report of authorized orders accepted for delivery.
 WPB-2639—Shipboard-type electric motors and generators: Manufacturers' monthly report of orders, shipments and schedules.
 WPB-1688—Office machinery: Application to purchase or rent new and restricted use.
 WPB-2581—New scales, balances, attachments or weights: Application for preference rating to purchase or rent.
 WPB-689—Chromium: Statement of stocks, consumption and request for allocation.
 WPB-1867—Manufacturers' and distributors' monthly report of new floor finishing, floor maintenance vacuum cleaning, and portable rug scrubbing machines.
 WPB-1262—Industrial power trucks: Producer's monthly report on proposed production and delivery schedule for trucks, and sales value of trucks and repair parts.
 WPB-417—Machine tool shipments and orders.
 WPB-2905—Iron and steel scrap: Dealer's, broker's and automobile wrecker's report of stocks, purchases, receipts, and shipments for October, 1943.
 WPB-2904—Iron and steel scrap: Consumer's report of stocks, consumption, and production for October, 1943.

COMING EVENTS

- Oct. 18 to 22—National Metal Congress and Exposition, Chicago.
 Oct. 18 to 22—American Gear Manufacturers Association, Chicago.
 Oct. 25 to 27—American Gear Manufacturers Association, Chicago.
 Nov. 3, 4—Meehanite Research Institute of America, Inc., Cincinnati.
 Nov. 10, 11—Industrial Hygiene Foundation, Pittsburgh.
 Nov. 17, 18—National Founders Association, New York.
 Nov. 19—Steel Products Warehouse Association, Inc., Chicago.
 Nov. 29 to Dec. 3—American Society of Mechanical Engineers, New York.
 April 2 to 5, 1944—The American Ceramic Society, Inc., Pittsburgh.

HIGH PRODUCTION HEAT TREATING WITH LOW B.T.U. FUEL



Over 30 tons of alloy steel per hour at 2250° F. is the production rate of this installation of five Salem double chamber, batch type furnaces. *It is operated by only two men, from charging through pre-heating and soaking to unloading.* High carbon, low carbon, and alloy steels—ingots, billets, and slabs—all are heated equally well. Using oil as a fuel, precise controls permit variation of atmosphere and temperature to suit the product being heated.

Similar Salem installations, operating with low B. T. U. gases, show equally good results when equipped with Salem Needle Metallic Recuperators, which pre-heat either gas or air for greater combustion efficiency and higher furnace temperatures. It will pay you to investigate how Salem furnaces can increase your production while saving 25% to 30% on your fuel bill.



Above are banks of Salem Needle Type Recuperators. By producing the most favorable degree of turbulence in air and waste gas streams, Salem's exclusive needle design provides maximum transfer of heat from waste gases to air with a minimum of back pressure. Made of Liesconit, these preheaters may be standard equipment on Salem billet heating furnaces, or they may also be installed in conjunction with your present furnace for higher efficiency.

SALEM ENGINEERING CO. • SALEM, OHIO

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IS
AVAILABLE...



The Wyandotte Representative can be in your plant if you wish. He can provide skilled technical help on your metal cleaning problems . . . help he's been trained by many years of *know-how* to provide.

Under wartime pressure, metal finishers can't wait. When one job's finished, another is instantly at hand. And that means the *swiftest* and most exacting cleaning and degreasing operations are indispensable.

Wyandotte Metal Cleaners provide the answer . . . *best* results, *big* savings. Compounds for armament and airplane parts manufacturing, automotive equipment, and for use in water wash spray booths are all Wyandotte specialties.

Let Wyandotte help chart your way to peak efficiency in all cleaning and degreasing operations. Just call in the Wyandotte Representative. He's at your service 24 hours a day.



Wyandotte

SERVICE REPRESENTATIVES IN 88 CITIES

WYANDOTTE CHEMICALS CORPORATION
J. B. FORD DIVISION, WYANDOTTE, MICHIGAN

● Wyandotte Chemicals Corporation consolidates the resources and facilities of Michigan Alkali Company and The J. B. Ford Company to better serve the nation's war and post-war needs.

Battle Reports Hit Industrial Safety

Chicago

• • • Press and radio reports of death and injury on the battlefield have complicated the problem of promoting industrial safety because of generally increased callousness among industrial workers, Wilfred Sykes, president, Inland Steel Co., told the metals section of the National Safety Council here recently.



Wilfred Sykes

This threat to morale has double seriousness, Sykes said, because of both the necessity for national production of war materials, and also the fact that the armed forces regard workers in industry as a manpower reserve. Industry's attack on the problem involves selection of the "proper individuals to do the right thing at the right time and keeping them in the proper physical and mental condition," he declared, and demonstrating to employees that management has a greater interest in them.

Indiana Harbor works in 1942, Sykes said, had more than twice the working force of 1917. The accident frequency rate for 1917 was 37.19 against 3.01 for 1942. The severity rate was 11.53 for 1917 against 0.94 for the year 1942.

R. D. Harvey, director of safety and education for the Murray Corp., Detroit, told the automotive and machine shop section that "conclusions based on more competent and more honest accident investigation resulted in a recognition of the fact that only about 15 per cent of all accidents do not involve a correctible mechanical feature."

C. C. Carlton, vice-president and secretary, Motor Wheel Corp., and president of the Automotive Parts and Equipment Manufacturers Association, said that in spite of the employment of millions of men and women who never before worked in factories or business, and in spite of an increase from 46,000,000 employed in 1940 to 64,000,000 today, occupational deaths in the first seven months of 1943 decreased by 400, from 10,800 in 1942 to 10,400 in 1943.

Out of a total of 22,000 employees

**Where Bearings
"Get The Works"**

SUN H. D. LUBRICANTS

"Do a Job"... Under Pressure, Heat and Water

In one of the country's largest steel mills, now turning out materials for tanks, guns and ships, Sun Heavy Duty Lubricants are helping to keep equipment on the job and producing at top speed.

For many years operators in this plant thought expensive lead soap and graphite greases were necessary for lubricating the roll neck bearings of blooming mills. But this practice was soon abandoned when Sun Engineers—those Doctors of Industry—recommended Sun Heavy Duty Pressure Grease. Now these lubricants stand up under extreme pressures, high heat, and water constantly flooding the rolls. Bearings show little or no signs of wear . . . lubricant does not wash off . . . and

lubricant lines are never clogged as was often the case with products previously used.

Today, in this plant Sun Lubricants are standard throughout . . . in pressure systems or hand lubricated installations . . . from bar mills to conveyors. Whether you operate a steel mill or a textile mill . . . a machine shop or a munitions plant there's a Sun Lubricant to meet your requirements. And Sun Oil Engineers always stand ready, willing, and able to help you help America with more production. Write . . .

SUN OIL COMPANY, Philadelphia

Sun Oil Company, Limited, Toronto, Canada



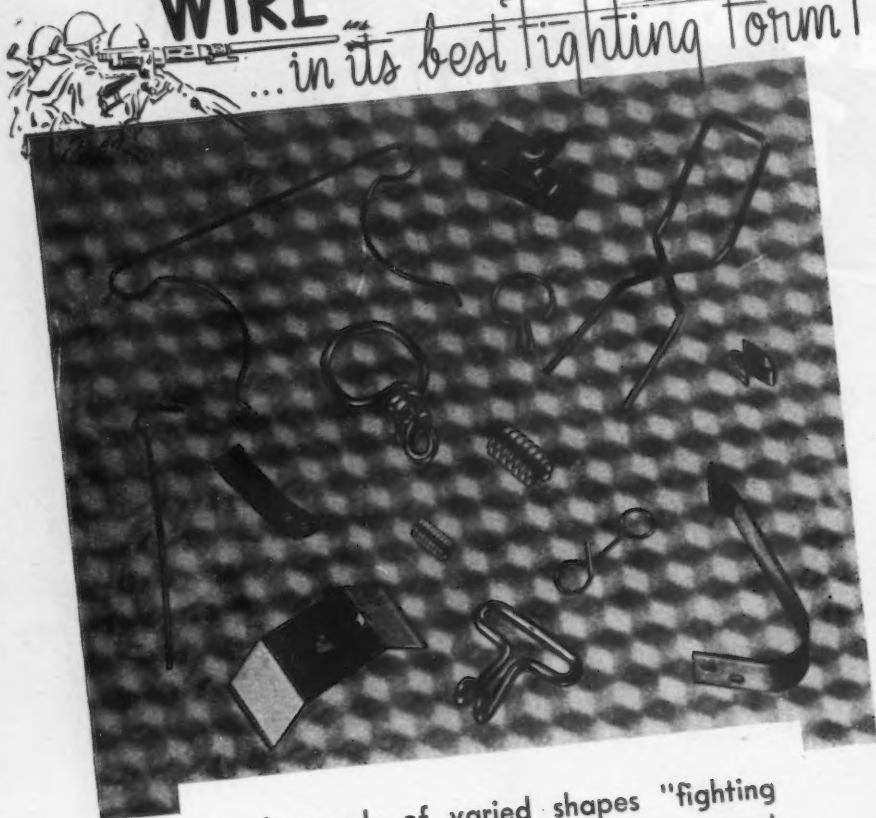
SUN PETROLEUM PRODUCTS

HELPING INDUSTRY

HELP AMERICA

WIRE

...in its best fighting form



In thousands of varied shapes "fighting wire" is on the war fronts. In bombs and shells; in tanks and guns and planes; in equipment and war material of many types, you'll find wireforms and springs doing a thousand-and-one vital jobs.

Above, you see a few of the many Accurate-made special wire shapes which are parts of fighting implements. They're produced in huge quantities to Accurate precision standards—under rigid control from raw materials to inspected finished products.

Accurate "know-how," based on experience and specialization, can help you solve your production problems that involve springs and wireforms. Tell us what you need and when you need it—it's as simple as that.

**WHAT
SPECIAL
WIREFORMS
DO YOU
NEED?**

*Accurate
Springs*

ACCURATE SPRING MFG. CO., 3819 W. Lake St., Chicago 24, Ill.

Free "Handbook on Springs". Send for your copy today. It is informative, compact, handy to use.

NEWS OF INDUSTRY

at the Gary Works of Carnegie-Illinois Steel Corp., 2327 are women, it was stated at a safety meeting of the Corporation held in conjunction with the Safety Congress. As of 1942, for the entire corporation, there were approximately 1000 women on operating jobs. Last December, the corporation made a study of the jobs women could fill and a recapitulation of the figures showed that at that time all the Carnegie plants felt that 16,318 women could be employed on operating jobs.

Details of New Compass Revealed at Philadelphia

Philadelphia

• • • Details of the new Bendix Gyro Flux Gate compass, a major contribution to the success of Allied bombing, have been revealed. The device uses the magnetic field enveloping the earth to develop minute electrical impulses which when amplified turn the compass indicator. The impulses are taken in through the "flux gate" which derives its name from the fact it receives and rejects the magnetic flux from the earth.

The flux gate and gyroscope are housed in a pear-shaped metal container. The gyroscope keeps the flux gate on a horizontal plane at all times.

PIN POINTS OF LIGHT on plastic noses for bombers are reflected from high intensity Westinghouse 400-watt mercury vapor lamps 42 ft. above the floor in a warehouse at Long Beach, Cal., plant of Douglas Aircraft Co.



NEED ANY HELP...



On GOVERNMENT SPECIFICATIONS for STAINLESS STEEL?

GOVERNMENT Specifications are complex . . . every word has meaning. Condensing them into simplified form or commercial grade designations involves the risk of omitting important descriptive detail.

You may be familiar with A. I. S. I. type numbers, and believe certain "specs" cover the same analysis as the type number. Yet there are other details to consider . . . special physical properties, tolerances as well as special testing requirements.

Very often "specs" permit latitude in your selection of analysis, physicals, tolerance and almost always — finish. Making use of allowable options for a specific use may greatly ease your problems of procurement or fabrication and here RUSTLESS can help you.

We produce nothing but Stainless Steels and through our daily familiarity with their specifications, we are in position to help. Write or wire the nearest Rustless Office for advice.

Rustless Producing STAINLESS STEEL Exclusively

WHEN YOU WANT TO KNOW ABOUT STAINLESS...



RUSTLESS

Iron and Steel Corporation

Baltimore, Maryland

CORROSION AND HEAT-RESISTING
STAINLESS STEEL

SALES OFFICES: BUFFALO • CHICAGO • CINCINNATI • CLEVELAND • DETROIT • LOS ANGELES • NEW YORK • PHILADELPHIA • DISTRIBUTORS IN PRINCIPAL STATES

THE IRON AGE, October 21, 1943—103



The smart ball club manager never overlooks a chance to win—with regulars or subs. • The winning industrial manager uses the same strategy. Today, many of them, who are short of light welded chain, are applying the heavier types of weldless as pinch-hitters. • The four types of American Weldless Chain shown above have surprised engineers and operating executives with their strength, their endurance, their adaptability to a variety of new jobs. • Write us for information about the substitution of Weldless Chains for needs formerly filled by Welded Chain, or for manila rope.

AMERICAN CHAIN DIVISION

York, Pa., Boston, Chicago, Denver, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Portland

AMERICAN CHAIN & CABLE COMPANY, INC.
BRIDGEPORT • CONNECTICUT



In Business for Your Safety

Aircrafters Claim Good Manpower Use

• • • Proposing to prove that West Coast aircraft manufacturers are making efficient use of available manpower the West Coast Aircraft War Production Council has issued the results of its manpower utilization study. Some interesting statistics released by the council include: Airframe production per employee of $2\frac{1}{2}$ times the pre-Pearl Harbor rate; a drop in production manhours on a fighter plane from more than 100,000 hr. previously to about 6000 manhours now; likewise, three types of planes each requiring about 100 men to build them now require only from 5 to 10 men, according to the report.

Within the last twelve months the Pacific Coast companies have trained more than 500,000 workers, of whom 50 per cent were given in-plant training for upgrading designed to increase the efficiency and productivity of employees.

Production, inspection and engineering departments, through mutual cooperation and training programs, have established standards and methods whereby sheet metal parts are permitted to vary in size as much as three times the limits previously used. This permits unskilled employees to work within wider limits, which

Women Quit Quick; 1½ Million Required

• • • For every two women hired for war production work in labor shortage areas during the month of June, one other woman quit her job, OWI reports.

Women in these plants are quitting at a higher ratio than are the men. The "quit" rate for women was 6.2 per cent of total female employment (four million) in June — or 248,000. The quit rate for men during that month was only 3.9 per cent of total male employment.

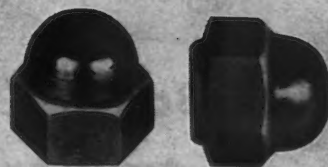
Separations for women were 7.9 per cent in the month; for men, 6.6 per cent. Hiring rates for the same period were 11.6 per cent of total female employment and 7.3 per cent of total male employment.

WMC estimates that in the year ending July, 1944, about 1,400,000 women will have to be added to the existing female labor force.

Which feature *is most important* on your work



ALL METAL



- ★ Resistance to vibration, shock, impact...
- ★ Fastest possible application in production...
- ★ Safe operation at high temperatures...
- ★ Corrosion-resistance even under extreme conditions...
- ★ Increasing locking grip on RE-USE*
- ★plus the many other important factors you expect in any good lock-nut.

*Where else can you get this feature?

This well established, patented locking principle combines these important lock nut features in *one* nut.

It is unlike any other.

One or several advantages may be more important than others in your requirements ... with An-cor-lox you get *all* in one!

Write for the newest An-cor-lox bulletin describing these features in detail. You will see quickly that these are not idle claims.

An-cor-lox samples will be sent on request. We especially invite inquiries for sizes $\frac{1}{8}$ in. bolt diameter and larger. For testing, specify size and thread.



An-cor-lox
TRADE MARK REG.
Lock Nuts

An-cor-lox Division
LAMINATED SHIM COMPANY
Incorporated
76 Union Street • Glenbrook, Conn.

BAKER TRUCKS

*speed handling of Ranger Engines
for Fairchild Trainers*



Fairchild PT-19 Trainer, called the "Cornell". This is the primary trainer for the U.S. Army Air Forces.

—another Baker Contribution to War Production

The superior training of our fighting pilots is an important factor in winning and holding American air supremacy. Efficient training planes are a vital part of this program Baker Trucks are helping Ranger produce engines for Fairchild trainers in ever-increasing numbers, at their Farmingdale, L. I. plant Wherever production schedules must be stepped up, Baker Industrial Trucks are on the job—releasing man power and increasing plant capacity If you have a production problem, a Baker Material Handling Engineer is ready to help you solve it.

Illustration shows Baker Fork Truck wheeling a Ranger "12" into the shipping lines. Wrapped in moisture-repellent Plio-film, each engine receives a last minute check before being sealed and delivered to the Armed Forces of the United States.



Fairchild AT-14 Trainer, called the "Bombardier". This is the Army's new bomber trainer.

BAKER INDUSTRIAL TRUCK DIVISION of the Baker-Raulang Company
2175 WEST 25th STREET • • • • CLEVELAND, OHIO

In Canada: Railway and Power Engineering Corporation, Ltd.

1306-1B-43

Baker INDUSTRIAL TRUCKS

NEWS OF INDUSTRY

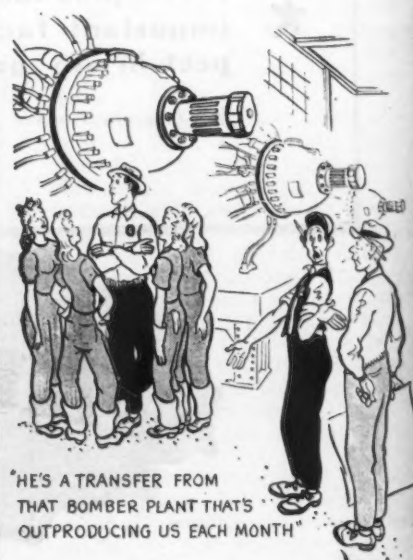
means faster production per hour of work, without adversely affecting safety and performance factors. This has been accomplished with the constructive cooperation of the Armed Services and the War Production Agency.

Skilled aircraft engineers are as hard to find as the proverbial needle in a haystack. It is not often practical to exchange engineers between companies, but delay has been reduced to a minimum through industrial teamwork which has added the equivalent of 206 engineer-years to plant staffs in the past 15 months.

A comprehensive pooling of all the technical data of the different companies is carried on through the Aircraft War Production Council and has accomplished a saving of 530,224 engineering manhours. Engineering exchanges among Council member companies for the 15 months from June 1, 1942, through September 1 of this year have totaled 4444.

Selective Service withdrawals fell with greatest impact upon the aircraft industry. By June, 1942, it became apparent that the pre-employment programs conducted in public schools to train workers for war industry were approaching collapse because of lack of students. Industry was compelled to offer employment to completely untrained workers.

In a tightened labor market aircraft plants have frequently been compelled to utilize workers who lack many of the qualifications previously considered essential in airplane production personnel. The effect has been felt in all departments of the industry. Workers who would in normal times



"HE'S A TRANSFER FROM THAT BOMBER PLANT THAT'S OUTPRODUCING US EACH MONTH"

V-749

LATROBE Double-Six

" You will recall the dovetail cutter job in which the tools lasted anywhere from five minutes to one-half hour, and the tools were not cracking but literally exploding. Well, we recently switched to Double-Six with great success. The first tool we tried made of Double-Six was used to machine several hundred pieces, and was in operation about one hundred hours. This was done on N.E. 8620 steel of a hardness of approximately 190 BHN.

The remarkable thing to the foreman of the milling machine department and the boys in the tool crib was that the tool was returned to the crib at the finish of the job and did not require grinding.

In fact, from what I have been told, the tool was cutting better at the finish than it was at the start. "

*definitely increases
tool life...
decreases set-up
costs...*

Ask for

a copy of LESCO REFERENCE TABLES, containing page after page of useful technical data and tables. FREE

THE above excerpt is from a letter recently received from an enthusiastic user of Latrobe DOUBLE-SIX. Such performance is typical of Double-Six. Not only will it be found to effect substantial savings in production time, but it will prove superior in many difficult cutting operations. Double-Six can be readily heat-treated to attain maximum efficiency.

Ask for special bulletin on Double-Six.

TOOL STEELS



FOR VICTORY

Latrobe ELECTRIC STEEL COMPANY

MAIN OFFICES and PLANT • LATROBE • PENNSYLVANIA



No Safety Program Is Complete Without *Efficient* Dust Control

DUST is perhaps the most cruel and treacherous safety peril of all.

Most other hazards are localized. Usually they threaten individuals singly. And when they strike the effect is immediate and visible.

Dust, however, threatens everyone within its reach. It attacks gradually and unseen, but its effect can be devastating.

That is why the dust control problem in your plant should be so carefully studied. Do not regard it with complacency. It is the most important factor in your entire safety program.

If you need counsel, write us and we will put a qualified dust control engineer on the job at once. Also write for our latest catalog No. 72, describing American high-efficiency dust control equipment.

**AMERICAN
FOUNDRY EQUIPMENT CO.**
510 S. Byrkit St., Mishawaka, Ind.



AMERICAN
HIGH EFFICIENCY
DUST COLLECTORS

be regarded as unemployables are now being utilized in large numbers.

Airplanes are a fluid—never a static—product, which means that there is always lacking the fundamental requirement of production stability or repetitive operation.

One aircraft manufacturer has worked on 41 different models during the past 18 months. Of those 41 models, 17 are now in production covered by 26 different contracts. Many of the older models are still in service.

The large number of contracts and models increases the difficulty of overall planning and utilization of engineering skills.

The airplane model of an established design frequently changes every three to six months, and even during this period of time, 250 to 300 changes often are incorporated in a model. An average of 50 engineering drawings must be altered for each of these changes.

Pacific Coast aircraft manufacturers believe that the facts assembled and analyzed in this report on Labor Utilization indicate that:

1. The need for the most efficient utilization of available labor was clearly recognized by industry leaders prior to U. S. entry into the war.
2. A sharp upward trend in production efficiency has been maintained in spite of tremendous obstacles presented by the exigencies of wartime expansion.
3. The industry has taken advantage of every opportunity to conserve man-hours and to avoid production delays through the unrestricted interchange of materials, facilities and information.

ARMY RIFLE GRENADES: By the addition of a launcher-adaptor, an ordinary army 30 rifle may be quickly altered to propel a high-powered rifle grenade. This weapon covers the interval between the distance a hand grenade can be thrown and the longer range covered by a mortar and the Bazooka.



CARBOLOY TIPPED MILLING CUTTERS

by Super!



New . . . in Speed, Accuracy and Money-saving Advantages!

Try them once, and you'll agree . . . these new Carboly Tipped Milling Cutters by Super Tool Company are the production man's answer to faster production, greater accuracy, and economy

far beyond anything heretofore thought possible. The proof is to be found in the work records of these tools in operation on actual production jobs. For example:

OTHER SUPER TOOLS

for

Turning, facing, reaming, spotfacing, broaching, forming, grinder rests, wear parts, boring, drilling, grooving, counterboring, shaving, centers and special purposes.

● In milling cast iron and non-ferrous materials you'll find them operating at feeds of .002" to .005" per tooth.

In steel you'll find them running at surface speeds of 400 to 800 feet per minute with tooth loads of .0005" to .0025".

On another job you'll find one cutting a slot $\frac{3}{4}$ " wide and $2\frac{1}{2}$ " deep from the solid in 3140 steel at a rate of feed 600% heavier than with regular high speed steel cutters.

You'll find them on many jobs cutting steel at table feeds of 5" to 18" per minute.

You'll find them producing extremely accurate work because at their faster operating speeds there is less distortion of work. Also they are producing finishes so fine that they compare favorably with ground surfaces.

And here is more economy! These new cutters are designed to be used for plain milling, slotting or side milling without alteration. Write today for descriptive literature and prices.

SUPER TOOL COMPANY

Carbide Tipped Tools

21650 Hoover Road, Detroit 13, Michigan



4105 San Fernando Road, Glendale 4, California

3 Electrical Huskies

to handle every light and power job

BUStriction DUCT for Flexible Power

Built in standard, interchangeable 10-foot sections, Bulldog BUStriction DUCT provides complete flexibility for power and lighting circuits—enables you to change production lines at will—rearrange whole departments without interrupting production elsewhere.

BUStriction DUCT is an integral part of the machines it serves. It is quickly and easily installed—100% salvable.

(Conforms fully with WLB Limitation Order L-273)

INDUSTRIAL TROL-E-DUCT for Feeding Portable Tools

With Industrial Trol-E-Duct, the source of power moves along with the tool—cutting operating cost, eliminating interruptions due to fixed plug-in points, increasing both safety and productive time, and making extensive savings in wiring and other fixed equipment.

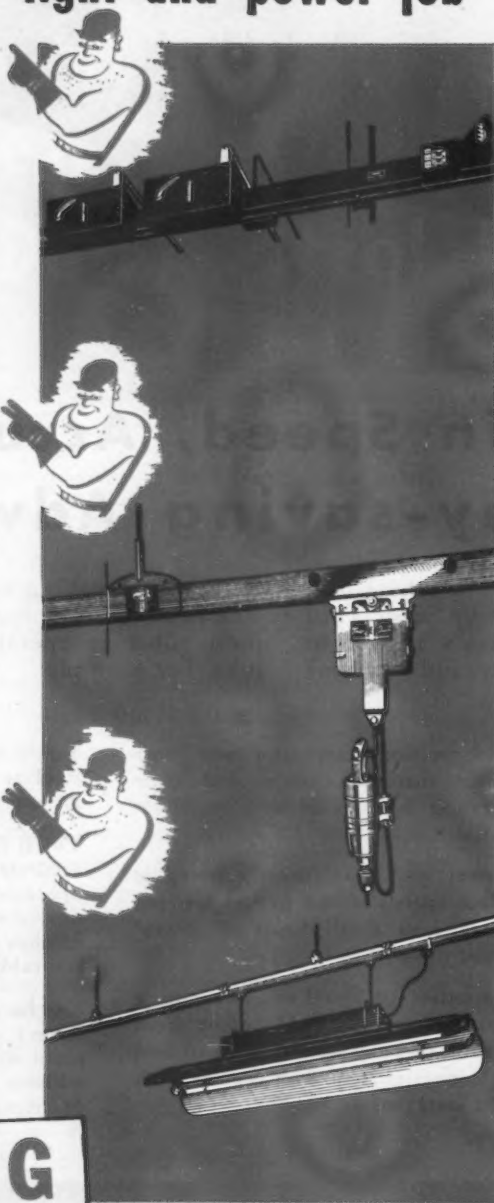
A fully descriptive bulletin will be sent on request.

UNIVERSAL TROL-E-DUCT for Flexible Lighting

What Industrial Trol-E-Duct is to power, Universal Trol-E-Duct is to lighting—a flexible system of quickly movable outlets.

Universal Trol-E-Duct puts light where it belongs—close to the work. It enables you to meet instantly any change in your lighting set-up or requirements, simply by moving lights along the duct or by adding new lights where needed.

Ask for full information about these and other Bulldog products.



BULLDOG
ELECTRIC PRODUCTS CO.

Box 177, R. Pk. Annex
Detroit 32, Michigan
Bulldog Electric Products of
Canada, Ltd., Toronto, Ontario
Field Engineering Offices
in All Principal Cities



MANUFACTURERS OF a complete line
of Vacu-Break Safety Switches, Panel-
boards, Switchboards, Circuit Master
Breakers and BUStriction SYSTEMS.

You SAVE What You
SPEND for WAR BONDS

NEWS OF INDUSTRY

Redistribution of Tools Is Clarified

New York

•••Supplementing the recent announcement that the WPB would redistribute approximately 10,000,000 used tools and machines, the Used Equipment and Machinery Branch has prepared a more complete explanation of the methods of redistribution to be followed. The explanation in specific question and answer form follows:

Is much equipment and machinery idle and available for redistribution?

Very considerable quantities of many types are available from many sources, and due to changing requirements on the part of the armed services, these quantities are expected to increase materially.

Who may purchase items of these types?

Anyone qualifying under existent regulations which apply to used or idle equipment or machinery.

Where can a purchaser secure information regarding needed equipment?

From the nearest regional War Production Board office.

Why should a purchaser accept used equipment?

Because of the saving in material, man hours, and machine time which is thereby accomplished, as well as the saving effected in time of delivery in many cases.

Is a rating required to purchase used equipment?

There are a few specific items controlled by Limitation Orders requiring a rating for used equipment. The regional offices can advise which items these are.

Is specific authorization for the purchase of any items of used equipment and machinery required?

Yes, there are several items of used equipment and machinery, such as sewing machines, laundry equipment, etc., that require specific authorization on a WPB form, even though the equipment is used. The regional offices can advise the proper form to use for any of these items.

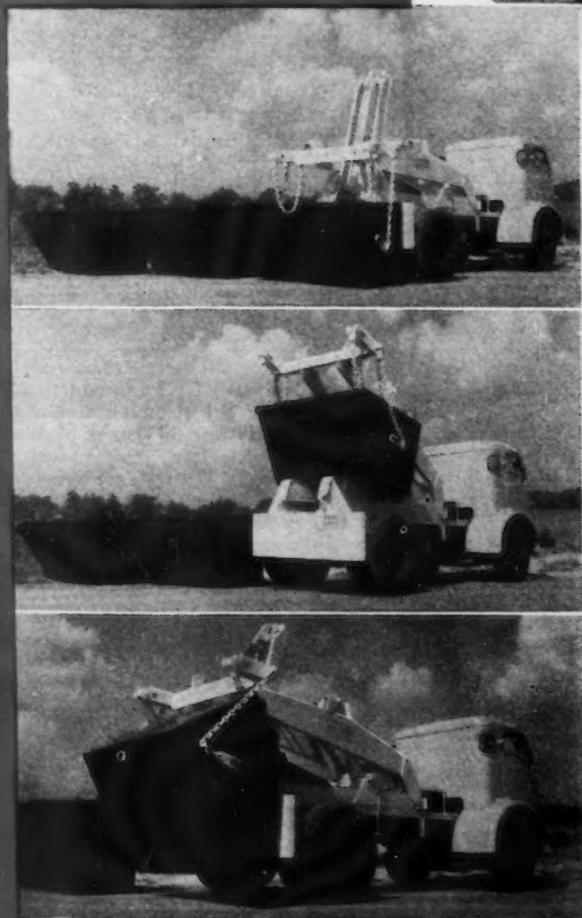
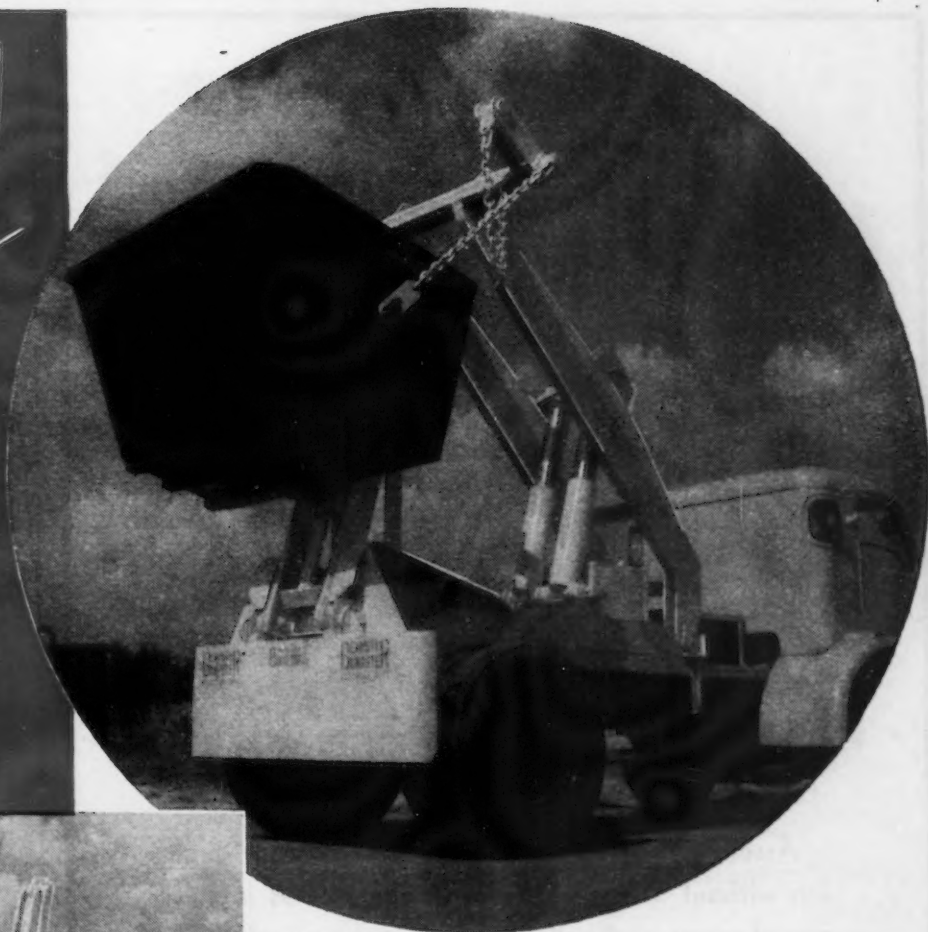
Do the usual controls or limitations apply to the purchase of unused idle equipment that is secondhand?

Yes.

What kinds of equipment are available?

Some 55,000 types of industrial equipment and machinery are available in used or idle equipment, although the supply may be very small

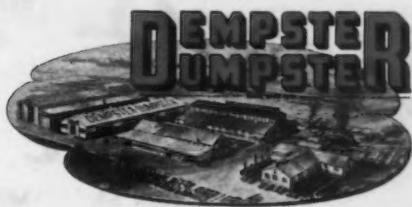
*Lifting
6 TONS
is duck
soup!*



DEMPSTER-DUMPSTER shown above produced for large steel plant—now serving a group of 20 bodies.

★ Another Dempster Development For Industrial Materials Handling

In hundreds of industrial operations throughout the nation, many of which are essential war plants, the Dempster-Dumpster is handling extremely heavy materials—hoisting, hauling, and dumping loads of almost unbelievable size and weight. Amazing as it may seem, a Model 500 LF Dempster-Dumpster truck unit will hoist any one of several types of Dempster-Dumpster bodies containing a pay load up to 7½ Tons with ease, place it in carrying position, haul it and discharge the load automatically, or set the load down intact, while other bodies, placed at convenient loading points, are being loaded. Other models of less capacity are available for lighter requirements for handling any type of materials . . . bulky, light or heavy . . . waste, unfabricated or finished product. It's simply a matter of adapting the Dempster-Dumpster to your needs . . . with one truck and any number of bodies of various types serving your requirements.



DEMPSTER BROTHERS, Inc., 8103 Springdale, Knoxville 17, Tennessee

Getting a LIFT with a Stearns MAGNET



Assembling this 4000-lb. track would be a tough job without Stearns Lifting Magnets. This is only one of many applications for Stearns magnets that help speed production in busy war plants.

Moving large quantities of material in fast time at low cost—guarding hand labor on difficult and dangerous operations, conveniently, safely and economically.

Increasing storage capacities, loading and unloading are a few of the advantages of using Stearns Lifting Magnets.

Let Stearns magnets give you a lift. We make 'em in many sizes and shapes. Why not consult Stearns Magnetic Milwaukee with your problem.

Write for our Bulletin 35.

Stearns

MAGNETIC MFG. CO.

635 S. 28th St.

Milwaukee 4, Wis.

SEPARATORS DRUMS ROLLS
CLUTCHES BRAKES
PULLEYS

NEWS OF INDUSTRY

in some cases and very large in others.

From what sources are lists of available equipment obtained?

From reports of equipment owned by used equipment dealers, from voluntary reportings from user-holders, from Treasury Procurement, from the War Department, from the Defense Plant Corp., and many other government agencies.

Is it mandatory that idle equipment be reported to the War Production Board?

The reporting of equipment in the hands of used equipment dealers is mandatory, but at the present time there is no order requiring industrial owners in general to make such reports.

Who is required to report?

Dealers in used or secondhand machinery and any other specific class of manufacturers of equipment covered by limitation order requiring such reporting.

What form is used?

In general, available used equipment and machinery is reported on Form WPB-2574, although certain other items such as machine tools are reported on special forms designed for the particular purpose.

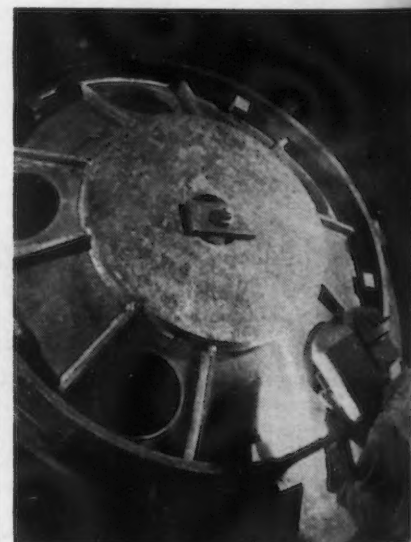
What types of equipment must be reported by dealers?

All industrial equipment and machinery in accordance with the list shown under price regulations.

When do these dealers report?

Whenever they purchase additional

NAVY POWER: Fastened to a tilted table on the production line at the East Pittsburgh Works of Westinghouse Electric, this steel "sunflower" is being fashioned into a rotor for an electric drive on a Navy ship. Tilting the rotor speeds up welding.



HOT PRESSED PARTS

by Titan



BRASS AND BRONZE RODS, FORGINGS
DIE CASTINGS, WELDING RODS

If you use parts of intricate shapes, sharp outlines, dimensional accuracy — your answer is Titan Hot Pressed Parts.

From blueprint to finished part you'll get prompt service, a high grade product and reasonable cost. With dense, small grained structure, Titan Hot Pressed Parts need very little machining and leave minimum scrap. No sand pits, blow holes or sand particles to contend with — long tool life.

For War Products — immediate delivery; for post-war planning — prompt engineering service.

Remember Titan are Brass Specialists. We offer friendly, personalized attention, backed by over a quarter century's research and experience.

Titan

METAL MANUFACTURING CO.
BELLEFONTE, PA.

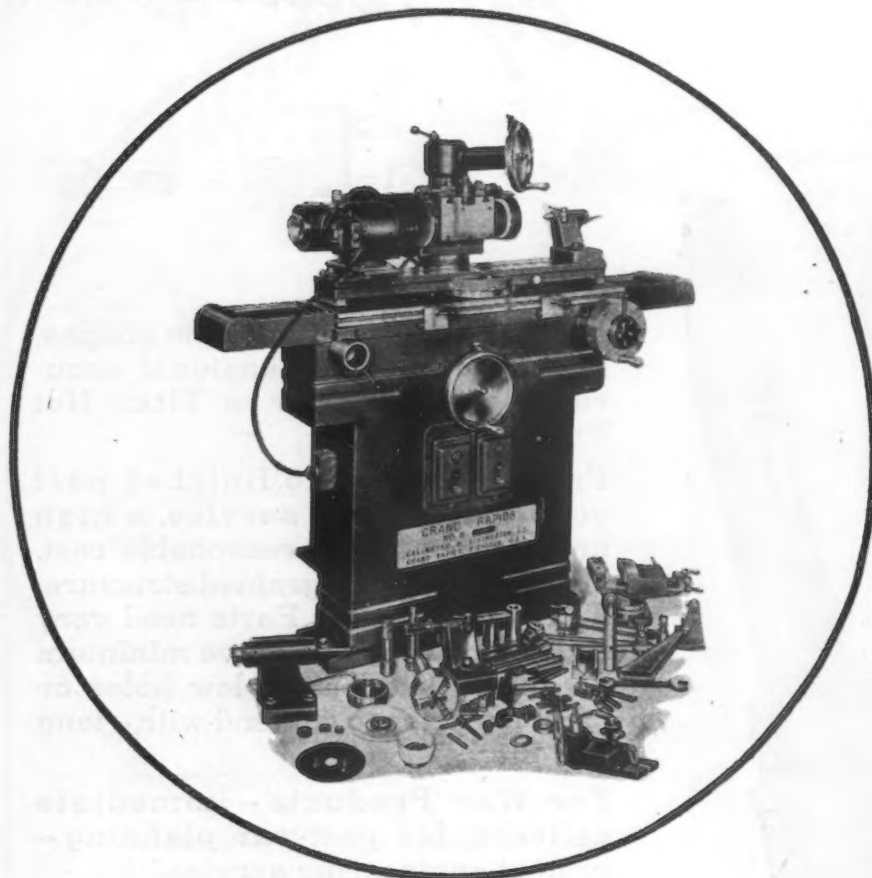
Quality Alloys by Brass Specialists



GRAND RAPIDS

UNIVERSAL CUTTER—TOOL GRINDERS

Are available in several sizes and types. We illustrate the No. 6 machine on which we can give you reasonably prompt delivery.



THIS NO. 6 GRINDER FEATURES

- Cabinet Base Construction
- Ball Bearing Table
- Hardened and Ground Stainless Steel Ways
- Fixed Table Height
- Cross Movement on Column Enables Operator to Stand Close to His Machine at All Times
- Convenient Location of All Controls
- All Wheel Shafts Mounted on Grease-Sealed Ball Bearings
- Provision for Built-In Dust Collector

THIS MACHINE IS DESCRIBED IN BULLETIN 11-1-41

GALLMEYER & LIVINGSTON CO.

200 STRAIGHT AVE., S.W.

GRAND RAPIDS 4

MICHIGAN

NEWS OF INDUSTRY

equipment or make a sale of equipment which they own.

To whom are inventory reports sent?

To the regional offices of the War Production Board in whose region the reporting company is located.

Where are lists of available equipment and machinery maintained?

In the Regional offices of the War Production Board for all types of equipment and in Industry Divisions in Washington for such types of equipment as are assigned to these divisions.

Is there any central file of such items?

No complete central file of such items is maintained, but the Used Equipment and Machinery Branch will advise purchasers on sources for any needed item.

Why is there no central file of all available equipment and machinery?

Because any such central file would involve better than 10,000,000 pieces of equipment and machinery, and would be so large that it would be impossible to handle from the standpoint of space and personnel. In addition, within a short time after such file was set up, the records would be untrustworthy because of deletions or sales from the list.

How are specific items needed to fill requests located?

By referring to existent files of equipment at the point at which the request is received. If the files do not show equipment as being available, the Redistribution Division will send out "Want Lists" to regional offices and to dealers, requesting the location of a specific item. This method has been found to be very effective and affords flexible procedure.

What information does a prospective purchaser receive in reply to a request for a specific item?

He will receive a list of possible sources from whom the item may be obtained.

Does the War Production Board guarantee the condition of used items referred to the purchaser?

No, the War Production Board accepts no responsibility for the condition of equipment referred to a purchaser. Such guarantees as may be demanded or given must be arranged between the owner and the purchaser, as is the case in all commercial transactions. The War Production Board helps to find suitable equipment, and authorizes its release where specific authorization is required.

How is this equipment priced?

The price of used equipment and



Tomorrow



Copper... or Stainless...
or Nickel... Brass, Bronze
or Silver... one side or
both sides... any thick-
ness desired.

OR KITCHENWARE, TOO

a new material

a new design opportunity

SuVeneer Trademark Reg. U. S. Pat. Off.

CLAD METAL

Saving a great tonnage of copper every month in vital military applications now, SuVeneer Clad Metal will march into the homes of America after Victory... saving household dollars, delivering better service, providing finer appearance! This exclusive Superior development brings a unique clad metal to the hand of the modern designer—in convenient strip form which can be shaped by any of the standard methods.

New metal-ware for tomorrow's kitchens is but one of many SuVeneer Clad Metal applications *worth knowing* for the future. May we work with you?

Superior Steel
CORPORATION

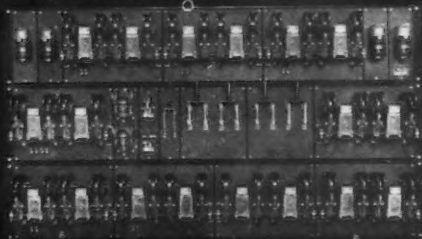
CARNEGIE • PENNSYLVANIA

THE Nameplate ON THE

CONTROL is EC&M



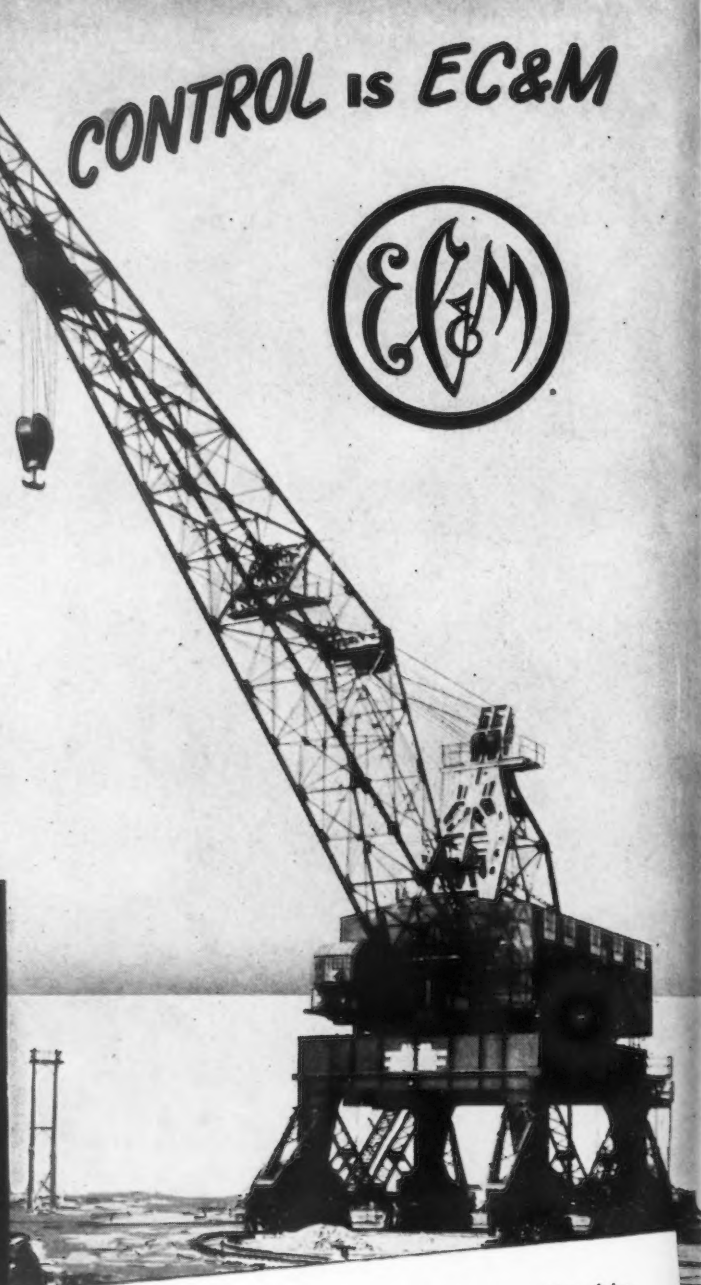
For Main, Auxiliary and Boom Hoists, typical Wright Dynamic Lowering Controller, as shown at left, is used. For 2-motor Rotate-motion, Typical Duplex Controller, at right, is used.



Typical Quadruplex Bulletin 921 Controller as used on 8-motor Travel-motion. Each leg has 2 motors in series with all four sets of motors operated in parallel.



EC&M Bulletin 1182 Type NT Master Switch for all motions, shown at left. Each motor is equipped with a Bulletin 1004 Type WB Brake, series-wound for Hoist motors, shunt-wound for Rotate and Travel motors.



THIS is called a fitting-out and repair crane used for ship construction. Several of this type have been built and placed in service quickly. No designer of the first hoisting-machines could ever have dreamed of units of such size . . . such mobility . . . produced so rapidly.

The Allies have been fortunate in that crane builders have satisfied the need for so many war-goods-handling equipments in such a prompt, efficient manner.

Control, although a small part of the cost, is a vital part of every crane. It protects as well as speeds operation. Line-Arc Contactors and Time-Current Relays respond quickly. For 2 or 4 mechanically-connected motor-drives, EC&M Duplex and Quadruplex Controllers keep the motors in step electrically. "Knowing how" can be of great value in getting the most from your cranes, safely. Specify EC&M Control.

A free copy of Booklet 920, "How to Operate a Crane" will be sent on request.

THE ELECTRIC CONTROLLER & MFG. CO.
2700 East 79th Street ★ Cleveland 4, Ohio

HERE IT IS: RACO H.D. NO. 11

...an ALL-POSITION A.C. ELECTRODE for Welds of Highest Quality

RACO H.D. #11 has been thoroughly tested on A.C. welding jobs. When RACO H.D. #11 is used, you are assured superior welds, free from gas pockets and slag inclusions!

RACO H.D. #11 complies with the following specifications: A.W.S.—A.S.T.M. Filler Metal Specifications A233—42T Classification E6011; Navy Bureau of Ships Specification 46E3, Grade III, Classes 1-2-3; American Bureau of Shipping Specifications HIG and BIG; A.S.M.E. Boiler Code, Paragraph U68.

HERE'S YOUR GUIDE TO THE RIGHT RACO ELECTRODE FOR EVERY A.C. WELDING JOB!

CLIP THIS
CHART! FILE
IT FOR READY
REFERENCE.

Write for samples and
literature and for in-
formation on delivery.

APPLICATION	REID-AVERY ELECTRODE	A.W.S.—A.S.T.M. CLASSIFICATION
Mild Steel in any position.	H.D. 11 H.D. 8	E6011 E6012 E6013
Mild Steel in flat position and horizontal	H.D. 6 H.D. 5 H.D. 30	E6020 E6030
High Tensile Steel in the flat position fillets	H.D. 64	E7020
Wear resisting surfaces, machinable	H.D. 82	

The

REID-AVERY COMPANY

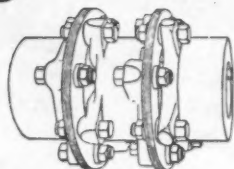
DUNDALK

BALTIMORE 22

MARYLAND

FIVE FEATURES OF THOMAS FLEXIBLE COUPLINGS

- 1** OPERATE UNDER MISALIGNMENT
- 2** NO BACKLASH
- 3** NO WEAR
- 4** NO LUBRICATION
- 5** FREE END FLOAT



FOR MAXIMUM EFFICIENCY OF DIESEL ENGINE DRIVES

THOMAS Flexible Couplings are the only couplings which provide all the features necessary to satisfactory performance of Diesel engine and large motor drives, where loads are subject to heavy pulsations. Send for a new Thomas catalog.



THOMAS FLEXIBLE COUPLING CO.
WARREN • PENNA.

machinery is in accordance with existent OPA price regulations. The bulk of equipment and machinery is priced under Maximum Price Regulation No. 136, which establishes a ceiling price of 55 per cent for "as is" equipment and 85 per cent for rebuilt and guaranteed equipment. An alternative method of pricing, based on age and fixed rates of depreciation, is provided under Amendment 76 to Maximum Price Regulation 136. Attention is called to the fact that prices established are the maximum which may be charged, but it is permissible to purchase this equipment at any agreed price below this maximum figure. Some types of equipment, such as commercial sewing machines, are covered under specific price regulations, establishing fixed prices for various makes and models.

Can an owner receive assistance from the War Production Board in disposing of items he desires to sell?

Yes, the War Production Board will be very glad to receive lists of equipment which any owner desires to sell and will refer prospective purchasers to such owners.

Is it mandatory that an industrial owner report such idle or used equipment?

Not at present, but the determination of the War Production Board to utilize existing equipment before authorizing the manufacture and purchase of new equipment may result in

SCIENTIFIC RELIGION. Rev. I. A.

Moon illustrates his "sermons from science" talks by allowing a million volts of high frequency electrical current charge through his body. Standing on a coil in his bare feet, he lets the charge crackle into the air off thimbles on his fingers.



RUGGED ACCURATE BED... Another Finer Feature of Logan Lathes



END TO END
VARIATION
OF PRECISION
GROUND V
AND FLAT WAYS
LESS THAN .001
OF AN INCH

The accuracy you need for precision work is yours in a Logan Lathe, even after long continuous use. For Logan combines solid strength and Nth degree accuracy in every Logan Lathe bed. Extra heavy ribbed and warp-free, the Logan bed is machined from the finest special analysis castings obtainable. Its V ways and flat ways are precision ground to an accuracy of within .001 of an inch from end to end. This fine construction, usually found only in the highest priced lathes, is another reason why alert production men are depending more and more on Logan Lathes for low cost production of small parts.

Write today for catalog sheets giving complete specifications on all models of Logan Lathes... Quick Change Gear Types... Manufacturing Turret Lathes... Hand Screw Machines... Floor Model Back Geared Screw Cutting Lathes... Bench Model Back Geared Screw Cutting Lathes.

LOGAN ENGINEERING COMPANY

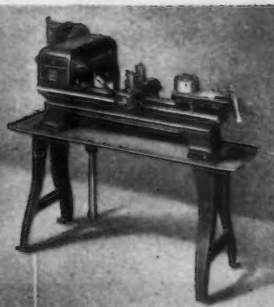
Chicago, Illinois

BRIEF SPECIFICATIONS

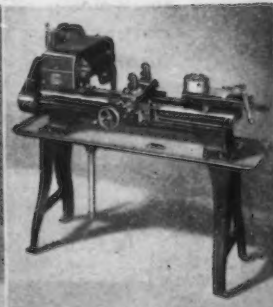
Swing over bed, 10½" ... bed length, 43¼" ... spindle hole, 25/32" ... capacity, ½" with push type collet ... 6-position automatic indexing turret ... stroke of turret, 4¼" ... 12 spindle speeds from 30 to 1450 r.p.m. ... all moving parts protected by ball bearings or self-lubricating bronze bearings.

Logan

... A NAME TO
REMEMBER
WHEN YOU
THINK OF
LATHES



No. 830—½" Capacity
Hand Screw Machine



No. 850—Manufacturing
Turret Lathe

PAGE for WIRE



Today's PAGE wire production goes wherever the needs of war direct it—as it should be. . . . But you will find it good business to discuss with PAGE now—or any time—your plans for after-war production.

GENERAL WIRE

Spring Wire, Bond Wire, Telephone Wire, etc.



SHAPED WIRE

Stainless Steel. Carbon Steel. Half-round, oval, triangle, hexagon, octagon, flat, keystone, etc. Diameters to $\frac{3}{8}$ ". End section areas to .250 sq. inch.

WELDING WIRE

Stainless Steel in analyses and diameters of such broad range that it is easy to choose from them the correct electrode for any Stainless Steel welding. A complete line of electrodes for welding all other steels. PAGE welding electrodes are handled by your local PAGE Distributor.



PAGE STEEL AND WIRE DIVISION

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In Business for Your Safety

AMERICAN CHAIN & CABLE COMPANY, Inc.

BRIDGEPORT • CONNECTICUT

NEWS OF INDUSTRY

mandatory reporting of all or certain urgently needed types of machinery and equipment.

Is the equipment formerly belonging to WPB, CCC, and similar government agencies being made available for purchase?

Yes.

Who is responsible for the disposal of WPA and similar items?

Treasury Procurement is responsible for the sale of government surplus of this type and is working through the War Production Board regional offices in effecting transfers.

Is there any list of such items?

Yes, each of the eleven regional Treasury Procurement offices publishes monthly lists of available surpluses. However, a very considerable volume of such items is declared to Treasury Procurement and sold between publications of lists, so that it is necessary for the prospective purchaser to contact the regional office of the War Production Board in order to be assured as to the availability in Treasury Procurement. Each regional office of the War Production Board has a man assigned to the proper Treasury Procurement regional office for the purpose of maintaining close liaison and an exact knowledge as to what equipment is available.

Where should a purchaser go to secure information regarding Treasury Procurement items?

To his regional War Production Board office.

On what basis can an industrial plant purchase items of this type?

By direct negotiation with Treasury Procurement, following approval of his request by the WPB regional office.

How long does it take to complete negotiations for the purchase of government surplus from Treasury Procurement?

This purchase is not a complicated procedure. On contacting the regional War Production Board office, the purchaser will be given a letter to Treasury Procurement, certifying his eligibility. On presentation to the Treasury Procurement Property officer of this letter and the necessary legal tender, the purchaser will receive an order on the warehouse in which the desired equipment is located, and the presentation of this order will immediately secure the item. Thus, within a very short time, the purchase may be negotiated.

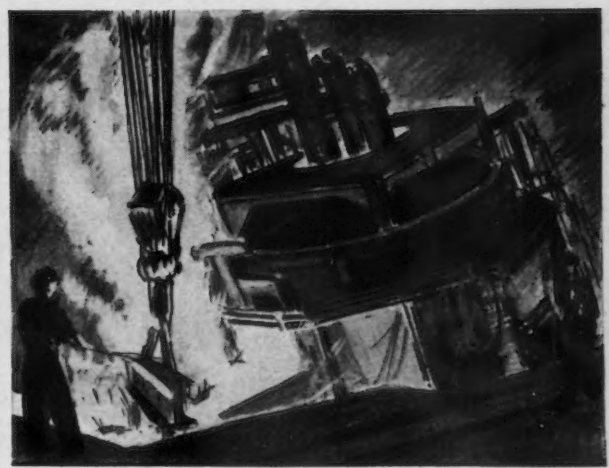
Can a dealer purchase such items from Treasury Procurement for resale?

Yes, a dealer may purchase such



Order Now...

Packing 50 lb. lots of Arcos electrodes in the well-known wooden box.



Electric melting furnace pouring a heat of special alloy steel for Arcos electrodes.



for February '44

From electric melting furnace to Arcos Stainless Electrodes boxed for shipment, is an interval of about four months. Therefore, the greater advance notice your order gives us, the more surely we can be prepared to meet your delivery requirements. Also the bigger your order, the more important it is to place it at least four months in advance of the desired shipping date.

ARCOS CORPORATION
481 NORTH BROAD ST., PHILADELPHIA, PA.

Distributors Warehouse Stocks in the Following Cities:

- San Antonio, Texas... Hart Industrial Supply Co.
Boston, Mass. (Beimont)... H. Boker & Co., Inc.
Buffalo, N.Y.... Root, Neal & Co.
Chicago, Ill.... Machinery & Welder Corp.
Cincinnati, Ohio.... Williams & Co., Inc.
Cleveland, Ohio.... Williams & Co., Inc.
Columbus, Ohio.... Williams & Co., Inc.
Detroit, Michigan.... C. E. Phillips & Co., Inc.
Erie, Penna.... Royd Welding Co.
Fresno, Calif.... Victor Equipment Co.
Fl. Wayne, Ind.... Wayne Welding Sup. Co., Inc.
Honolulu, Hawaii... Hawaiian Gas Products, Ltd.
Houston, Texas... Champion Rivet Co. of Texas
Kansas City, Mo... Welders Supply & Repair Co.
Kingsport, Tenn... Silp-Not Belting Corp.
Los Angeles, Calif... Victor Equipment Co.
Milwaukee, Wis... Machinery & Welder Corp.
Moline, Ill... Machinery & Welder Corp.
Montreal, Canada... G.D. Peters & Co. of Canada, Ltd.
New Orleans, La... Wm. D. Seymour Co.
New York, N.Y... H. Boker & Co., Inc.
Oklahoma City, Okla... Hart Industrial Supply Co.
Pampa, Texas... Hart Industrial Supply Co.
Pittsburgh, Pa... Williams & Co., Inc.
Rochester, N.Y... Welding Supply Co.
San Diego, Calif... Victor Equipment Co.
San Francisco, Calif... Victor Equipment Co.
Seattle, Wash... Victor Equipment Co.
St. Louis, Mo... Machinery & Welder Corp.
Syracuse, N.Y... Welding Supply Co.
Wichita, Kansas... Watkins, Inc.



"QUALITY WELD METAL EASILY DEPOSITED"



Even before production begins, time, space

and manpower are saved when handling of raw materials

is systematized by

TOWMOTOR



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TOWMOTOR CORPORATION • 1230 E. 152ND STREET, CLEVELAND 10, OHIO
STRAIGHT-GAS POWERED INDUSTRIAL TRUCKS EXCLUSIVELY—SINCE 1919

122—THE IRON AGE, October 21, 1943

NEWS OF INDUSTRY

items, but not on a negotiated basis.

Under what conditions can a dealer purchase?

A dealer may bid on the purchase of such equipment for which Treasury Procurement has advertised for bids. A dealer may also request Treasury Procurement to put up for bids any specific items in which he is interested, and his name will then be included in the list of bidders to whom the equipment is offered.

Does the Redistribution program entail the dumping of huge amounts of such equipment on the open market?

No, the Redistribution program is set up only to provide sources from which individual firms can locate needed equipment and is designed to perform a service for such prospective purchasers in the furtherance of the immediate war effort.

Do the usual WPB controls and limitations apply to items listed by Treasury Procurement?

Yes, it will be necessary to secure the proper authorization for such items as require an authorization to purchase used equipment, even though it is owned by Treasury Procurement.

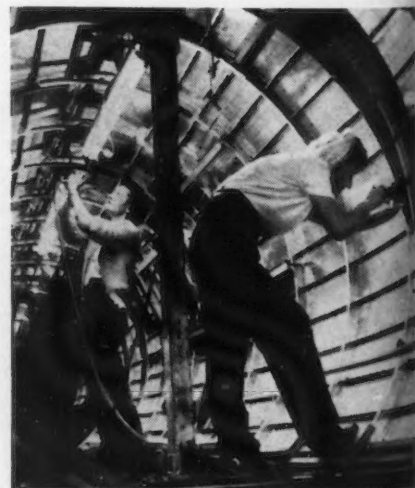
Can a private individual purchase any of this equipment?

Yes, if qualified, although Treasury Procurement is not in favor of the receipt of a multitude of applications from private individuals for small single items.

What is being done about surplus equipment owned by the Army?

The Army has established a staff branch in Washington charged with

CARGO PLANE "CAVERNS," like the one below at Douglas Aircraft Co., are illuminated by special portable lighting fixtures using Westinghouse 40- or 20-watt Mazda fluorescent lamps.



How to Trap Gremlins in Springs



ALL OVER BUT THE SHOOTIN'

Is Hitler washed up? We don't know. But we do know that thousands of planes, ships, tanks and bombs are pointed his way, helped by springs. And that the design of many of these springs can be facilitated by reading "Science in Springs". Your copy is now ready for you and will be mailed immediately on receiving your name on your business letterhead.

*I*N a cluster of draftees, in a barrel of apples, in a clip of shells, in a batch of springs . . . in every quantity made by nature or man . . . there are variations from any chosen standard. What those variations are and why they occur it is often important to know. When springs run into millions, statistical control must be exercised to bring the largest possible portion within the desired specifications. Statistical control of springs uncovers the gremlins of quality and production, detects underlying causes for variations, controls or eliminates them, anticipates changes

in quality. In the example below, a sample lot of springs was tested for load and length and readings noted. From the results a frequency curve of variations and a "skyscraper" chart were prepared. The height and location of the "Skyscrapers" show how many, and how much springs vary from given specifications. Statistical control is everyday work at Hunter, a matter-of-fact part of insuring the ONE right spring for your job.

Varied and interesting and presented in our last advertisement those interested in

AT YOUR COMMAND
Write, wire

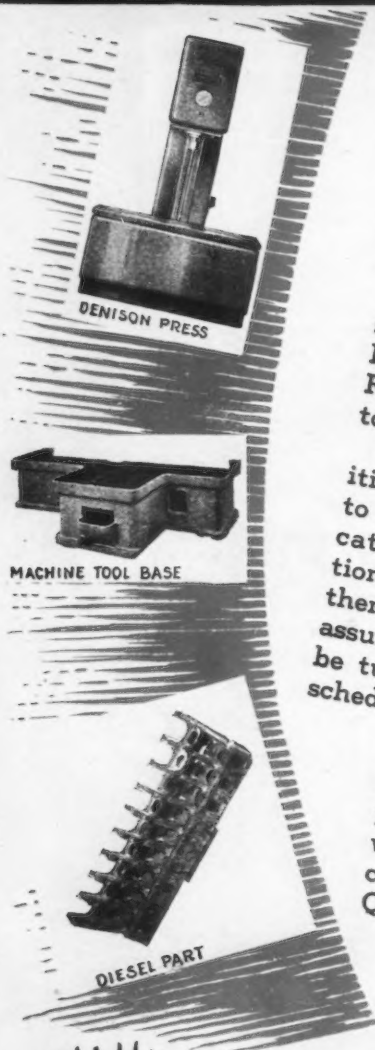
REPRINTED BY REQUEST—In response to many inquiries from the first printing of this advertisement, we wish to advise that our statistical control system is based on the American War Standards for Quality Control. These* may be obtained from the American Standards Assn., 29 W. 39th St., New York 18, N. Y.

Any authorized person who happens to be in our vicinity is welcome to drop in and see our system in actual operation. Hunter Pressed Steel Co., Lansdale, Pa. "Guide for Quality Control" (Z1.1-1941) and "Control Chart Method of Analyzing Data" (Z1.2-1941) printed together in one pamphlet and "Control Chart Method of Controlling Quality During Production" (Z1.3-1942). Price of each pamphlet is 75 cents.



HUNTER
Science in Springs

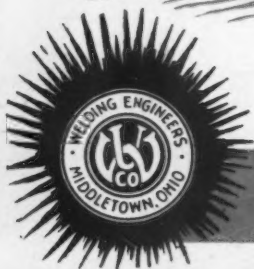
HUNTER PRESSED STEEL COMPANY, LANSDALE, PENNA.



An unusual design . . . but not improbable. Stranger things than this will flash upon the post war scene. When such a design is created the logical source for fabrication of the housing and various interior parts would be United Welding Company.

Parts so welded are lighter, stronger, more dependable. Pattern costs are saved. Rounded corners, unusual contours are produced with ease. United Welding has the facilities and the engineering staff to handle your most complicated and difficult fabrications. The same drive that won them an Army-Navy E gives assurance that the work will be turned out right, and on schedule.

Plan to weld as much of your product as possible. Lay it out with that thought in mind. Then contact United Welding Co. Quotations on request.



THE UNITED WELDING CO.
MIDDLETOWN, OHIO

WELDING FABRICATORS OF MODERN DESIGNS

the responsibility of collecting and recording all Army surplus and facilitating its redistribution in order to save material, man hours, and machine time. They have established a policy controlling this redistribution and facilitating negotiations for the transfer of such equipment under a new directive, known as Procurement Regulation No. 7. Complete information regarding this directive can be obtained by contacting the Redistribution Division representative in regional offices of the War Production Board.

Is there much of this equipment to be made available?

Due to changes in programs and completion of projects, very considerable amounts of equipment and machinery are now becoming available for redistribution.

Who can purchase equipment of this type?

Anyone directly or indirectly connected with the war effort, or war contractors or their suppliers may obtain authority to purchase this equipment through the regional offices of the War Production Board. In effect, this makes equipment of this type available to anyone who can show that its use is essential to the war effort or to the national economy. This is a considerable change from the previous regulation, permitting sale only to war contractors; and since the sale can now be made on a negotiated basis, the movement of such items should be greatly facilitated.

Where can a prospective purchaser find out what equipment owned by the Army is available?

By contacting his regional War Production Board office.

How much red tape is there in connection with the purchase of such equipment?

The bulk of red tape formerly existent in connection with such purchases has been eliminated under Army Procurement Regulation No. 7, which permits a negotiated sale to be effected.

Do the usual WPB controls and limitations apply to the purchases of Army surplus items?

Yes, all the usual controls apply to these items, so that authorization to purchase will be necessary for such items as are included under the various Limitation Orders.

What is being done about NYA equipment?

Under the provisions of the Act of Congress terminating NYA activities, special treatment has to be given this equipment before it can be declared as

SKILLS FOR

Destruction in the War



Construction in the Peace



★ Much of American Industry's war effort is necessarily going into guns, tanks, bombs and other instruments of destruction. But from the remarkable technical advances made in meeting the stern necessities of war will come the means for better living when peace returns.

Here at Aluminum Industries, for example, the intensive development work involved in meeting the demands of wartime service for Permite Aluminum and Magnesium Alloy Castings, forecasts many startling innovations in the structure and design of the products of tomorrow.

Planes of greater range and speed, better automobiles, improved railroad equipment, more efficient machinery, greater conveniences for home and office will result through the broader application of the advantages of light weight with extra strength afforded by Permite Castings of Aluminum and Magnesium Alloys.

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PERMITE ALUMINUM AND MAGNESIUM ALLOY CASTINGS



Th

Steel is a song of work that has been set and sung to many scores in the long history of its development and production.

★ ★ ★

The tune and tempo are martial now and, in stirring rhythm, it is sung by the work and sweat of more than six hundred thousand men throughout this land . . . day and night, day in and day out . . . as they break record after record in turning out millions upon millions of tons of fighting steels for our fighting men. It is sung by production at the ore pits . . . the coal mines . . . the quarries . . . on rail, lake, and river. It is sung by an all-time high output at the coke ovens . . . the blast furnaces . . . the steel furnaces . . . the rolling mills. It swells to a mighty chorus of loyal, hard work that converts the good, red earth, that is iron, into the many steels that become the guns, the ships, the tanks, the planes, the bombs, the shells to arm our sons and brothers . . . protect their lives . . . as they invade and crush the enemy.

★ ★ ★

So is the battle song of steel sung by work in the war of the world . . . for this is a war of steel . . . and by virtue of enterprise, ingenuity and rich natural resources . . . America is the great



The Battle Song of Steel

arsenal of steel . . . the overwhelming producer of steel. And because America sings the song of steel at work for war in increasing volume . . . with deep-throated purpose . . . a determined will to do . . . our fortunes are on the rise and the dawn of peace is seen from the heights of hope.

★ ★ ★

Of steel at war we sing. With steel we fight. With steel as the basic means we unleash a host of other lighter metals and materials for waging war . . . for invasion from the air . . . from the sea . . . and by land . . . so that our coordinated services shall have every weapon needed to forge the victory.

★ ★ ★

When that gage is won and the peaceable kingdom ushered in . . . the song of steel will be set to the score of service . . . with all its accumulated skill and far-sighted science . . . sharpened by the fiery experience of war . . . devoted to the creation of better things for better living for all mankind.

JONES & LAUGHLIN STEEL CORPORATION

PITTSBURGH, PENNSYLVANIA



CONTROLLED QUALITY STEEL FOR WAR



Prompt Delivery!

ON THESE WESTINGHOUSE WELDERS

Need a-c or d-c arc welding machines? Westinghouse offers any of the models shown on this page for *immediate delivery*.

Westinghouse A-C Arc Welders boost welding speeds from 15 to 30 per cent . . . because arc blow is eliminated; heavier electrodes can be used; no "time-outs" for maintenance are necessary.

Westinghouse D-C Flexarc Welders, with new Arcontrol, are the favorite of welding engineers and operators everywhere. Just one simple adjustment gives the welding current desired . . . and Arcontrol offers choice of three types of arc.

For quick delivery or more information, call your Westinghouse distributor or Westinghouse office.

J-90477



FOR HEAVY-DUTY, PRODUCTION WELDING
A-C Welder Model WC-3C—500 amperes. Infinite number of current settings from 100 to 625 amperes.



FOR HEAVIER THAN AVERAGE WORK
A-C Welder Model WC-2C—300 amperes. Infinite number of current settings from 60 to 375 amperes.



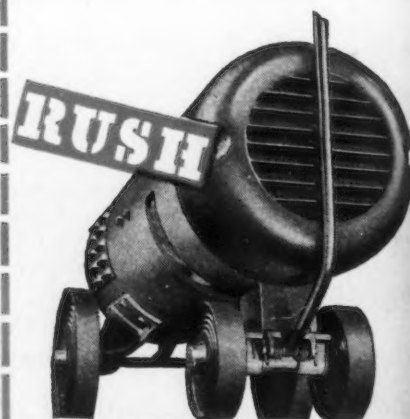
FOR ALL-PURPOSE WELDING
A-C Welder Model WT-4C—200 amperes. Has 27 different current settings from 20 to 250 amperes.



FOR MAINTENANCE AND LIGHT WORK
A-C Welder Model WT-1C—100 amperes. Has 15 current settings from 20 to 140 amperes.



FOR UNIONMELT* WELDING
Westinghouse A-C Welders for use with the Unionmelt Process available in 500, 750, 1,000 and 1,500-ampere models.



300-AMPERE FLEXARC D-C WELDER
New single preset current adjustment plus ARCONTROL. No exciter, rheostat or reactors to fiddle with.

Westinghouse WELDERS

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE



surplus. Under the provisions of the act, all schools operated cooperatively with NYA, using NYA equipment, which desire to continue their courses and were in operation as of the date of the act, are allowed to retain the equipment for the duration plus six months. The balance of the equipment is available for a period of time to other government agencies, including Army and Navy, and for the purposes of loaning to other schools desiring to establish training courses. When it has been determined that there is no further demand on the part of these schools, the equipment will be declared to Treasury Procurement as surplus and will then be available for general redistribution in exactly the same manner as other Treasury Procurement surplus items. It will be not less than 90 days before this equipment becomes available.

Must a purchaser accept used equipment when applying for new?

Under recent orders, a mandatory clause has been inserted requiring certification to the fact that no used equipment is available before applications for new equipment can be granted. At the present time, this applies particularly to PD-1A's, PD-3A's, PD-4X's, and applications in the P-19-h series, whether processed in the regional offices or in Washington. It is expected that the same mandatory clause will become a part of other application forms.

Will all available items referred to a prospective purchaser be used items?

No, many items received as Army surplus and from other governmental

sources are not "used" in the sense of having been operated, but are brand new and often in the original packing.

With whom can a purchaser negotiate for the purchase of Army surplus?

These negotiations can be carried on with the designated officials in the various field offices of the Army, as for example, the Area Engineers whose names are listed with the War Production Board regional offices. Every list of Army surplus furnished to the regional offices shows with whom negotiations may be conducted.

Are any items withheld from War Production Board regional office lists?

Yes, certain items which are extremely scarce or of an unusually technical nature are listed only with the industry divisions in Washington.

Do Claimant Agencies have access to files of available equipment?

Yes, the various Claimant Agencies have access to these files and are encouraged to contact the Redistribution Division (Service Section).

Is the present redistribution program of the War Production Board intended to cover post-war disposal of surplus equipment?

No, this program is designed purely to render assistance to those needing equipment at the present time, which is essential for the war effort or national economy, and is concerned only with the immediate emergency.

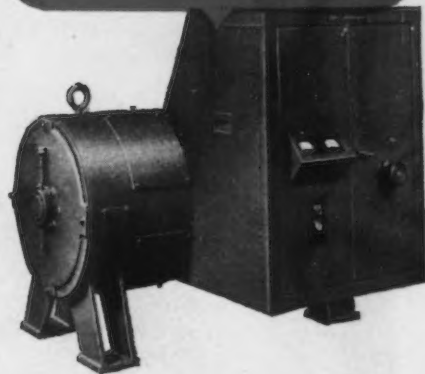
In general, does this program contemplate any new or revolutionary methods of locating and disposing of available equipment?

The entire program is designed around the use of existent mechanisms.

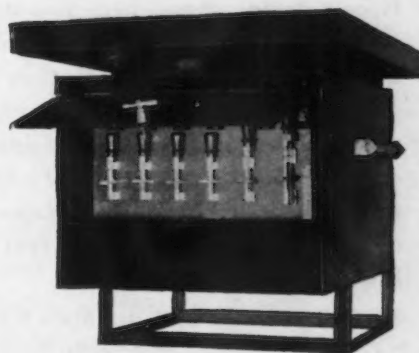
SELF-SUPPORTING COLLECTOR: Saving workers' automobile tires from tacks, nails and pieces of metal, a new magnetic scrap pick-up built largely from scrap material, makes the rounds of General Electric's parking lots every Sunday. In six days of action, the scrap collector picked up 8000 lb. of metal.



ONE
MULTIPLE-OPERATOR SET
DOES THE WORK OF
20 TO 30
SINGLE-OPERATOR SETS



For continuous-duty, mass production welding where a large number of operators can work in a small area, specify Westinghouse Constant-Potential Multiple-Operator Sets. Welding control panels can be assembled in banks or used singly. Operating power factor, where synchronous motor drives are used, will average 80% leading. Over-all efficiency is 45%.



Operator control panels are available in single and two-operator types. Current range is 150, 200, 250 and 300 amperes. Same range for each operator on two-operator types. Dripproof enclosures. For latest literature, write to Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., Dept. 7-N. J-90477

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PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

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thousandths
of an inch*



DIE-CUTTING of Booth felt parts is a precision job . . . often to tolerances in thousandths of an inch. Every die in the vast Booth stock is accurate. Each Booth-designed machine has its skilled operator. To the controlled qualities in Booth "prescription" felts—made to suit your individual requirements—add precision cutting. Exact duplicating of any felt part, re-ordered after a lapse of time, is considered a feat. Booth does it consistently.

THE BOOTH FELT COMPANY
477 19th Street Brooklyn, N. Y.
747 Sherman Street Chicago, Ill.

APPLICATION CHART AND SAMPLE KIT . . . Contains swatches of S.A.E. felt types, with specification tables. Write for it. (No sales follow-up.)

Booth
TRADE MARK

**PRECISION CUT
FELT PARTS**

Briefly Told—

361 Boats Built For Fishing; Commissions For Two Months Set

• The construction of 361 vessels, to be added to the nation's depleted fishing fleet, has been authorized during the last five months. More than half of them will be completed before the end of this year. Materials for the vessels are included in the amount allocated under CMP by WPB to the War Food Administration.

• The Bureau of Internal Revenue has granted employers permission to pay commissions due employees for September or October where neither the rate of commission nor the amount of any other compensation has been increased since Oct. 2, 1942.

The announcement said that the Bureau is considering future policy regarding stabilization of commissions, bonuses and similar forms of compensation. The approval was granted under revised salary stabilization regulations issued Sept. 4, which required approval before the payment of commissions exceeding in amount the payments in the last accounting period prior to Oct. 3, 1943.

• Imports into the United States during the second quarter of 1943 showed an increase of 3 million tons over first quarter receipts, Dr. William Y. Elliott, of WPB, revealed. Total imports for the first half year amounted to 20 million long tons, with June arrivals almost twice as great as those in January. Total imports by air for the period reported on amounted to approximately 3,330,000 lb.

• Savings of more than \$4,000,000 annually have resulted from renegotiation of contracts for utility services at Army installations, it was announced Oct. 9 by the War Department.

• C. August Mayer, general manager of the Precision Tool & Mfg. Co., Westfield, Mass., in a recent talk disclosed that his firm recently completed 22,000 precision units under contract out of which only six were returned as not meeting rigid requirements.

• To prepare for post-war expansion of air conditioning activities, Westinghouse Electric & Mfg. Co. has transferred all heavy duty air conditioning and industrial refrigeration manufacture from its East Springfield, Mass., to Jersey City.

• A new shortage looms for some important New England war industries—water. Consumption of water by such plants has increased tremendously, in any number of instances 100 per cent or more. Lack of rain plus increased consumption has drawn down municipal water supplies dangerously low in some cases.

• Buffalo Foundry & Machine Co. recently poured 300,000 lb. of iron into a single mold to make what is believed to be the heaviest gray iron casting produced in Western New York. The casting, designed as the anvil block of a huge

steam drop hammer for war production, will weigh 130 tons when trimmed and cleaned. Pouring at 2460 to 2560 deg. F. required 7 minutes, 33 seconds.

• A major part for the Army's new "brief case howitzer" is being made in Buffalo plants, according to Col. Frank J. Atwood, chief of the Rochester Ordnance District.

Officially the M-3 submachine gun, and also known as the "riveter," the weapon can fire 450 45-cal. bullets a minute. It costs less than \$20.

"The M-3," says Col. Atwood, "uses neither the raw materials nor the machine tools normally required in gun manufacture. All but two parts can be stamped out as easily as tomato cans. Ten thousand shots can be fired before it gets too hot to handle."

• The Tennessee Coal, Iron & Railroad Co., Birmingham, blew out its No. 6 blast furnace at Fairfield Steel Works on Oct. 8 for relining expected to be completed in about 60 days. On Oct. 4 the company blew in its Holt blast furnace.

• Charles R. Hook, president of the American Rolling Mill Co., will be principal speaker at a banquet concluding the annual meeting of Associated Industries of Alabama. The meeting will be held at the Tutwiler Hotel, Birmingham, Oct. 21.

• Of 1038 automobile plants from coast to coast engaged in war work, 316 are in Michigan, a summary shows in the 1943 edition of Automobile Facts and Figures, the yearbook of the Automobile Manufacturers Assn., issued last week. Ohio is the second largest automobile industry plant center, the report indicates, with 150 plants. Illinois has 98.

• At the October meeting of the Detroit section of the American Welding Society, W. S. Loose of Dow Chemical Co., discussing magnesium welding, touched on preheating technique. Preheating of cast alloys was recommended, inasmuch as they usually contain more than one per cent zinc, a proportion which often develops a film of molten metal if welding is attempted at room temperature. William E. Cain of Ford Motor Co. spoke on aluminum welding operations at Willow Run. This plant, he says, uses cadmium-bearing copper alloys for electrodes, generally similar to the welding of mild steel. Technique employed, he stated, is generally similar to the welding of mild steel.

• Industrial application of an X-ray unit made by the Kelley-Koett Mfg. Co., Covington, Ky., facilitating X-ray inspection in a large plant making a secret device for the Navy has helped reduce rejections running as high as 75 per cent to an average of four per cent, the company says.

• J. R. Onerheim, personnel director for

A Worthwhile Suggestion
for any
War Industry...

KEEP UP-TO-DATE ON YOUR STEEL "SPECS"!

If you work with steel—designing, fabricating or purchasing — keeping posted on Government "specs" can save you plenty of grief. May sound elementary, but recent Frasse experiences indicate otherwise.

Take, for example, the instrument maker who recently received from another supplier stainless steel ordered to a Navy "spec". The steel did not meet his requirements, and, suspecting an off-analysis, he called upon Frasse for confirmation. Frasse, knowing the "spec" had been revised 3 times in two years, found the supplier had automatically (and correctly) furnished steel to the latest revision—an unusual analysis for special application only. Result: a ton of critical stainless steel sidetracked from the war effort, plus additional delay until the correct analysis could be obtained.

Frasse subsequently spent a day with the man-

ufacturer's purchasing director, designers, and metallurgists, compiling "spec" conversion charts and revising prints. "Spec" checking with Frasse is now a regular process with this war contractor.

Frasse, incidentally, regularly issues identification charts showing up-to-date Government specifications for alloy, stainless and carbon steels—copies are obtainable free from any Frasse office. Meanwhile, why not (1) always mention the effective date of the specification to which you order, (2) keep posted by regularly checking your purchasing records and blueprints with Frasse. *Peter A. Frasse and Co., Inc., Grand Street at Sixth Avenue, New York 13, N. Y. (Walker 5-2200) • 3911 Wissabickon Ave., Philadelphia 29, Pa. (Radcliff 7100-Park 5541) • 50 Exchange Street, Buffalo 3, N. Y. (Washington 2000) • Jersey City, Hartford, Rochester, Syracuse.*

Frasse

Mechanical and Aircraft STEELS

SEAMLESS MECHANICAL AND AIRCRAFT TUBING • COLD FINISHED BARS • ALLOY STEELS • AIRCRAFT STEELS
STAINLESS STEELS AND TUBING • DRILL ROD • COLD ROLLED STRIP AND SHEETS • WELDED STEEL TUBING





When our daring paratroopers leap upon the enemy from the air, action is sudden, fast, decisive.

Fast action, decisive action is just as vital on the home front. Here at Acme, we keep stepping on the gas for all-out production in the shortest possible time. Whether it's patterns, dies, heat-treated aluminum castings, or specialized tools needed by war plants, our watchword remains, "Do It Right—And Do It Fast."

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NEWS OF INDUSTRY

Allis-Chalmers at Milwaukee recently told members of the industrial relations association there that the rate at which newly employed workers were quitting had risen to 30 per cent and going higher.

• The Morrison-Knudsen Co., Boise, Idaho, members of the syndicate which built Boulder Dam, has signed a contract with "Companhia Dio Doce" for reconstruction of the Victoria Minas Railway that forms a part of the project in Brazil for the transportation of ore from the Itabira mines to Victoria. The road will be double tracked to carry 5,000,000 tons of ore per year vs. its present capacity of 1,000,000 tons. The U. S. purchased the mines from Great Britain and lend-leased them to Brazil.

• Eastern Machine Screw Corp., New Haven, Conn., has developed a speed calculator chart for machine operators which it is selling for 15c. because of the limited supply.

• Assisting in the revival of the coke industry on the Pacific Coast, the U. S. Bureau of Mines has issued a report describing coking tests conducted on six western Washington coals, some of which now are supplying a new by-product plant at Tacoma, Wash.

• To serve as an aid in teaching welding students the fundamentals of working with stainless steels, Allegheny Ludlum Steel Corp. has completed a motion picture called "Welding Stainless Steel." The two-reel film can be obtained without charge by addressing your request to the company at Brackenridge, Pa.

• The experimental installation of a steel roadway strip 48 ft. long and 22 ft. wide, in Darien, Conn., is expected to provide the answer to the practicability of entire roads of steel grid. The project is a joint venture of the town of Darien and the Irving Subway Grating Co.

• The Civil Service Commission is searching for laboratory mechanics for war work in the National Bureau of Standards, Washington, one of the principal research and testing laboratories of the government. The mechanics are needed to do work connected with the construction, installation, assembly, maintenance, overhaul, repair, and operation of electronic, machine shop, automotive, electrical, and general equipment.

• At a meeting held in Cleveland recently the Indoor Climate Institute was formally organized by leading manufacturers in the heating, cooling and equipment industries.

"... The aircraft situation on the West Coast is the perfect example of Selective Service taking eight per cent of the men and receiving 90 per cent of the blame for the fact that production schedules have not been met. ... The local boards can hardly escape a feeling of futility when they see 140,000 workers leave an industry during a period in which the local boards removed 10,000." (Major Gen. Lewis B. Hershey, director, Selective Service System.)

• Due to the growing demand for more critical inspection and more rigid specifications for war production castings a new committee on inspection of castings has been set up by the American Foundrymen's Association. It will stress methods for improving the quality of castings

mainly from the purchaser's point of view.

• The greater part of United States Steel Corp. \$700,000,000 war expansion program has been completed and placed in operation and the remainder will go into production in the near future, Irving S. Olds, chairman of the board of directors, disclosed in a foreword to the October edition of "U. S. Steel News." Work on the largest of these undertakings, the new Geneva Steel Works in Utah, is now nearing completion and a contract for its wartime operation has been placed by the government with the Geneva Steel Co., newly formed subsidiary of U. S. Steel.


• Sir Nigel Campbell, chairman of the non-munitions committee of the Commonwealth Supply Council in London and head of the non-munitions section of the British Ministry of Production, has arrived in Washington for a short stay. The purpose of his visit is to observe at close quarters the working of the Combined Production and Resources Board.

SEABEE'S WORK: The Navy's Seabees built this steel matting bridge across the Matanikau, following the Battle of Matanikau River. The bridge enabled Marine Corps assault troops, plus supply units, to make hurried crossings.





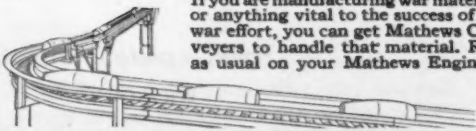
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Macwhyte Atlas Slings... some of which you see on this page... are such equipment. They expedite handling, speed production *safely* because they are so easy to handle, so lightweight for their comparative strength.

The illustration shows the reason why.



Notice that a Macwhyte Atlas Sling is made of opposite lay endless wire ropes, woven in a direction contrary to the lay of the rope itself. That is, left-lay ropes are woven in a right-hand spiral, and right-lay ropes are woven in a left-hand spiral. This construction is patented.

The result... and this is what interests you most... is a unique lifting element with great flexibility and unusual strength, features which make possible both safety AND speed when using Macwhyte Slings to lift your loads.

There are other features, too. Macwhyte ATLAS Slings are lightweight, easy to handle... positively non-spinning... kink-resistant... non-damaging to loads. They

store easily in small space... have no splices to wicker... terminate in natural loop ends.

There's an excellent chance that these slings can be of real help to you. Consult with us. You know what needs doing. We have the slings (developed from years of experience) to do the job. Or, if we haven't, we'll design the sling you need, and make sure that every bit of steel in it gives you maximum service. Call on us... let's work it out together.

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Among the Week's Trade Notes

Colonial Broach Co., Detroit, has opened direct factory offices in South Bend, Ind., and Cincinnati, Ohio. T. S. Mellen has been placed in charge of the South Bend office, 601 Tower Building. E. W. Brock will head the Cincinnati office at 1409 Union Central Life Insurance Co.

Detroit Tap & Tool Co., Detroit, has opened a Toledo factory branch office, located at 1506 Toledo Trust Building. Mr. Teague and W. F. Haverstock are the service engineers at the new branch. The company has also expanded its lines to include the production of tapping machines, tap reconditioners and thread milling cutter checking equipment.

Electro Refractories & Alloys Corp., Buffalo, has moved from the Andrews Building to new offices in the Vars Building.

Utility Tool & Die Mfg. Co. has moved its plant and offices from 536 Commercial Street, Glendale, Cal., to 1370 West Washington Blvd., Los Angeles 7.

The Duraloy Co., Scottsdale, Pa., has appointed Robert Onan as its sales representa-

tive in the Chicago area. Mr. Onan's offices will be in the Wrigley Building, and will be known as the Duraloy Co. of Chicago. The company has appointed Kilsby & Graham, Standard Oil Building, Los Angeles, as sales representative in the California area.

Commercial Advertising Agency, Inc., Chicago, will become Gebhardt & Brockson, Inc., after Nov. 1.

E. Karselen, Inc., have moved their plant from 56 West 45th Street to a new larger plant at 125 West 45th Street, New York.

Tube Turns Co., Louisville, has opened two new West Coast offices. T. H. Pike, Jr., is in charge of the office at 2611-12 Russ Building, San Francisco, and John M. Hartley is in charge of the one at 422-A Smith Tower Building, Seattle.

Hill Advertising, Inc., New York, have been appointed to handle the advertising for the industrial publications *Practical Builder*, *Building Supply News*, *Brick & Clay Record*, and *Ceramic Industry*.

Ransome Machinery Co., Dunellen, N. J., has become a wholly-owned subsidiary of Worthington Pump & Machinery Corp., Harrison, N. J.

Continental Contract Among Recent DPC Actions

Washington

• • • Defense Plant Corp., RFC subsidiary, has authorized the following contracts:

Nash-Kelvinator Corp., Detroit, to provide additional equipment at a plant in Wisconsin at a cost in excess of \$120,000, making a total commitment of more than \$36,700,000.

Continental Roll & Steel Foundry Co., Chicago, Ind., to provide additional facilities at a plant in Indiana at a cost in excess of \$110,000, making a total commitment of more than \$5,900,000.

Heyden Chemical Corp., New York, to provide plant facilities in New Jersey at a cost in excess of \$900,000.

Northwestern Aeronautical Corp., Minneapolis, Minn., to provide plant facilities in Minnesota at a cost in excess of \$800,000.

Lombard Iron Works Co., Augusta, Ga., to provide plant equipment at a plant in Georgia at a cost in excess of \$33,000, making a total commitment of more than \$220,000.

• • • The War Department announced Oct. 13:

1. Award of a contract to H. B. Zachry Co., San Antonio, Tex., for construction at an Army Air Forces installation in Webb County, Tex., to cost in excess of one million dollars. This work is to be supervised by the San Antonio district office of the Corps of Engineers.
2. Authorization for construction at an Army Air Forces installation in Los Angeles County Cal., to cost approximately a million dollars. This work is to be supervised by the Los Angeles district office of Engineers.

WPB Urges Higher Output of Construction Equipment Parts

Washington

• • • An urgent appeal to manufacturers of construction equipment to increase production of repair and spare parts was issued last week by the WPB Construction Machinery Division. Present output of parts is at the rate of 50 per cent of the total dollar value of equipment produced, while peacetime output of parts was at the rate of 15 per cent of total production, by dollar value. Despite this increase, not enough parts are being produced to meet present requirements, division officials said, and 1944 demand is expected to be even higher. Most urgently needed are parts for power shovels and cranes.



Electric Furnace Operators Examine Operational Problems

(CONTINUED FROM PAGE 51)

40 ratio of coarse and fine grained magnesite, and if any intermediates are used, they should be kept under 10 per cent of the total. Coarse magnesite should go through a 4-mesh but rest on a 14-mesh screen, while the fines should pass through a 60 or even a 100-mesh screen. Careful checking of the bottom density should be maintained by ramming small samples under fixed conditions. And non-porous magnesite grains should be used.

In side wall construction, the use of basic or silica brick is favored, with basic brick gaining in favor. New hydraulic press molds for making metal encased sidewall brick has aided considerably in bringing this type of material into favor. In basic roof construction, the economy and availability of silica brick makes its use almost universal, but its melting point of 3110 deg. F. is close to the furnace operating temperature. Other roof material such as fire clay, a 45 per cent alumina brick, and special materials such as those containing Indian Kyanite have also been used. The use of basic brick instead of silica brick on the roofs has been proved uneconomical, because of the high initial cost of the basic brick.

C. A. Brashares, Harbison-Walker Refractory Co., also pointed out the advantages of high magnesia rammed mixtures for electric furnace bottoms and stated that their high ferro-clay content gives an extremely stable bottom. Better control of silica brick manufacture tends to increase the use of this material for furnace walls. Some of the methods toward more economical construction and maintenance of electric furnaces stressed by Mr. Brashares were furnace designs that incorporate standard sizes and shapes of refractory brick, since, in addition to costing less, these materials offer better refractory properties.

All speakers on refractories were in agreement that there were no basically new refractories expected in the near future. New silica mortars that have very high melting points have aided in the extension of the use of silica brick. The use of water cooling and its effect on refractories was also discussed, with E. K. Pryor, Charles Taylor Co., stating that in some places

the benefits of water cooling are extremely problematical. Better furnace design, he claimed, can do more than water cooling in some instances. The chances for studies along the lines of water cooling, better coordination of different refractory materials and the development of air guns to apply refractories are especially fertile, Mr. Pryor claimed.

The question of lead in scrap and its effect on furnace refractories was brought up. It is believed that the effects of lead are purely mechanical in electric furnaces, and very dense furnace bottoms are one way of offsetting its ill effects.

Scrap

That the steel industry is having too many headaches resulting from the many problems in its increased dependence upon war industries to properly handle and segregate scrap was evidenced by the interest in the general discussion meetings on scrap for electric melting furnaces. While lauding the WPB, OPA, and other government agencies for their part in helping the steel industry with its scrap problems, it was evident that W. W. McMillan, National Malleable & Steel Casting Co., was not alone in finding it difficult to keep sufficient usable scrap on hand to insure maximum furnace operations. He pointed out that the allocations of scrap necessary last winter caused some extremely high delivered prices for this material, but stated that the average delivered price throughout the year was not too excessive. Furthermore, while inventories of scrap on hand at furnaces are not too bad, frequently such scrap is of poor quality and losses are high. The future supply of scrap, especially late during the coming winter, is not too bright and will not improve much in spite of the industrial scrap drive that has started.

Changes in war production, curtailment and cancellation of contracts, improper segregation of scrap, closer crops of ingots and billets by the rolling mills, and the export of finished war implements have all tended to lessen the scrap supply. Mr. McMillan also remarked that elaborate plans are under way for the preparation of battlefield scrap totaling 1,000,000 to

1,500,000 tons that will be brought back to the United States during this year.

A. C. Texter, Atlas Steel Co., Welling, Ont., particularly stressed the need for better scrap segregation, pointing out that in addition to its value for recovering alloys, it practically facilitates melting practice, accelerates production, and enables the furnace operator to get the optimum tonnage from a given furnace. A system of segregation aids melting, cuts melting time, and gives the melter a known metal bath.

C. R. Staley, American Rolling Mill Co., stated that good foreign scrap no longer exists, since such scrap, and especially turnings, is of unknown content, contains considerable non-ferrous material, and cuts down the melting time in electric furnace operation by as much as 20 per cent. W. J. Regan, Copperweld Steel Co., pointed out that the lack of segregation in the SAE 2300 and 255 series makes these grades extremely difficult to obtain. He pointed out that at the present time 16 per cent of alloy scrap was in the SAE 4100 class, 6 per cent in the 4300 class, 6 per cent in the 1300 class, 4 per cent in the 3300 series, 2.5 per cent in the 4000 series, and 19 per cent was made up of N. E. grades. The scrap received by melters now is very poorly segregated and this field offers considerable, since the alloy determination of scrap is vitally important. At present, Mr. Regan stated that his company makes use of various methods of grade determination on non-segregated scraps, such as spark testing, spot testing and chemical analyzing.

From the electric melter's standpoint, it is believed that bundling and briquetting will become considerably more important. However, in the briquetting of turnings, it is extremely desirous to remove the oil on the turnings by burning, heating, chemically cleaning, or centrifuging. Oil on turnings has been known to increase the carbon of an electric furnace charge by as much as 10 points per 1000 lb. of turning charged. Likewise, the sulphur in the oil has a detrimental effect, making it further necessary to remove this material.

The types of scrap available to the electric steel producer vary by districts, as do the character and quantities of scrap. Consequently, it was pointed out that melters must adjust their operating practice to conform with the scrap available. While in basic practice, phosphorus and sulphur can be controlled, this is not so

in acid steel production. Various mills represented claimed that their turnings charges consisted of as much as 15 per cent by weight of the entire scrap charge. However, this depends considerably on the charging method used on the furnace. One electric steel producer that manufactures tool steels conducted a close survey on the tool steel scrap purchased. The results of the survey were that 40 per cent of the shipments received analyzed outside the specifications for tool steel scrap and 10 per cent wasn't even high speed steel.

Slag Making and Oxidizing

Extensive discussions of slag-making and oxidizing materials, with

low phosphorous content. This sinter is acquired from the ore mining operations owned by Republic Steel Corp. in New York.

J. P. Small, Farrell-Cheek Steel Co., emphasized that the problems of oxidation and slag making of the foundryman differed widely from those of the ingot manufacture. Because of the complexities of the molds, very thin and thick sections in molds, and the entirely different structure of foundry molds from ingot molds, fluidity of the melt is of extreme importance to the foundryman but of negligible value to the ingot maker. Consequently, the slag making and use of oxidizers in electric furnace

any time previously, and since that time alloy steel production has increased 10 times. In spite of severe shortages of alloys during the past two years, the steel industry from this standpoint is in the best position it has been in since the beginning of the war. The strict limitations placed on the use of alloys, the manufacture of leaner alloyed steels, and the increase in alloy production capacity have made this desirable condition possible. However, there has been one ill effect resulting from the manufacture of lean alloy steels, in that they produce ternary alloyed scrap. This almost invariably gets mixed with binary alloyed scrap, and now many plants that had been making binary alloyed or carbon steel can't get scrap that is free of undesirable alloys such as chromium. The tendency now is toward the elimination of binary alloyed steels and toward alloys with three or more alloys.

Stocks of ferro-manganese and ferro-chrome are very good at present but in the manufacture another problem arises. Manganese and chromium ore are imported and made into the ferro stocks in this country. These operations, together with the manufacture of ferro-silicon, compete with aluminum for the available power supply. However, their availability is all in keeping with requirements now and no shortages are expected in the future.

In discussing the nickel supply, T. N. Armstrong, International Nickel Co., claimed that there was now four times more nickel available than in any pre-war year. The critical shortage of nickel that existed some months ago has been eased. When alloy steel production was increased, the demand for nickel held by mills as working stocks likewise increased. Now, however, this bank is full. The factors that worked toward easing the nickel supply situation were varied. Segregation of scrap helped tremendously in spite of the present claims that scrap segregation is not too efficient. This actually created a new source of nickel, Mr. Armstrong claimed. The stainless varieties for appearance were eliminated and low alloy content in other steels was stressed. The N.E. grades were greatly helpful. Nickel was recovered in tremendous quantities from non-ferrous scrap and materials other than steel. All of these factors tended to ease the supply of nickel, together with the increase in nickel production capacity. Now, the United Nations are far more comfort-



REGISTERING at the first annual conference of the Electric Furnace Steel Committee of the American Institute of Mining and Metallurgical Engineers.

trends and sources of materials were started off by a paper by W. N. Farnsworth, superintendent of the Canton Division of Republic Steel Corp. It was his contention that in the use of oxidizers, clean lump ore was somewhat better than roll scale, but the high silica in some of these ores has caused trouble and makes the use of excessive lime in the slag blanket necessary. In the use of roll scale, care must be taken that it is not contaminated with nickel or chromium unless these types of steels are being made. However, if stainless scrap is being remelted and it contains oil, grease, or other carbonaceous material, the roll scale must be pure in order to reduce this carbon. The best oxidizer found in the Republic Canton operations has been Chateaugay sinter which has an extremely high iron content and a very

practice in the foundry differs widely from those in ingot steel production.

The fundamental basic slag is a high lime slag, but care must be exercised in the use of lime that it be extremely dry. Otherwise, hydrogen pickup from the moisture by the metal is likely. For the purpose of prohibiting the introduction of moisture into the slag, one plant is installing equipment to completely dry lime and other slag materials such as sand and fluorspar. Likewise, care must be taken that fluorspar is free of lead, zinc, and other similar materials. This has become more of a problem within recent months.

Steel Making Alloys

At the time of Pearl Harbor, Frank Foley, director of research of Midvale Steel Co., said electric steel production was 40 per cent higher than at

ably fixed on nickel supplies than are the Axis powers. The United States, Great Britain, and Russia have just about 95 per cent of the nickel supplies in the world.

Discussing the supply of molybdenum in the United States, Carl M. Loeb, Jr., vice-president, Climax Molybdenum Co., stated that because moly was called to replace nickel, by May 1, 1943, moly stocks were exceedingly low. However, in the space of five months, conservation of molybdenum plus expansion of production has permitted molybdenum production to exceed consumption and stocks again have gained a comfortable position.

Vanadium production, according to Jerome Strauss, Vanadium Corp., at the time of Pearl Harbor was twice the production and consumption at any time during the 20 years previous. Tool steels placed a burden on this element, and at the peak of tool steel production took 50 per cent of the available supply. The two types of vanadium, that of high carbon and high silicon and that of low carbon and low silicon, can be juggled to meet demands. The former type, used in steel production, was increased by increasing the extent to which this material was recovered from ores, increasing smelting capacity, and utilizing borderline products.

That the steel industry will be permitted to use more aluminum is a certainty, Walter Bonsack, National Smelting Co., stated. Aluminum that has been contaminated with iron is of no use in aluminum smelting, and much aluminum scrap falls into this category. Iron contaminated aluminum occurs because of bad melting, contact with stainless steel, and poor scrap sorting. Another growing source of this material is the ever increasing number of smashed aircraft that is now coming into the country from fighting fronts. The segregation of aluminum from ferrous materials in these is almost impossible, and consequently, considerable of this aluminum will be available to the steel industry for metallurgical purposes. While this iron contaminated aluminum will be available in increasing quantities, pure aluminum will not be available. However, if the impure aluminum is of known quality, its use could be highly beneficial in steel production. The greatest factor that will hamper its use will be if it is mixed too badly with other metals such as copper, manganese, chromium, lead, cadmium, zinc, magnesium, etc., all of

which play an important part in aircraft construction.

Melting and Oxidizing

The Saturday meetings, which were expected to be more of a technical or theoretical nature, followed fairly closely the pattern set on Friday by conforming more to practice of furnace operation from the viewpoint of the melter and furnaceman. The Saturday meetings were divided into two phases, one covering acid practice and the other covering the heavier tonnage basic practice. Discussions of preferred furnace charges developed with variations in opinions among the attendants according to company practice and local conditions. The balance of light vs. heavy scrap; the use of roll scale, ore, sinter, and other oxidizing materials; the use of limestone vs. burnt lime, and other phases of electric furnace operating practice came up for consideration. However, there was no one-sided agreement on any of these phases, their use depending upon the preference of the operator and local supply conditions for the various materials.

Also, the conservation of power and optimum furnace power loads were discussed. In a study of 30 heat sheets of a 50-ton furnace, H. C. Bigge, Bethlehem Steel Co., stated that it was found care must be exercised not to start power too high, as it was extremely hard on refractories. The ideal power feed for the furnaces, as determined from the heat sheets was to start at a lower power input, somewhere close to 191 volts and 25,000 amps. for about 10 min., then switch over to the higher input, which in that case was about 282 volts and 30,000 amp.

N. C. Stansel, General Electric Co., proposed a committee to study the electrical problems and equipment of the electric furnace. It was his belief that many operations could be made standard and, in some instances automatic by the development of better electrical equipment. There is a definite trend toward standardization, he claimed, and electrical apparatus is not keeping pace with furnace design. However, objections were raised to Mr. Stansel's proposal, when Samuel Arnold, American Bridge Co., stated that ten years ago furnace builders met to standardize on electric furnace design. This was impossible, because new problems constantly occur.

In melting stainless, the problems of utilizing stainless scrap came up for discussion. Starting with virgin materials there is no difficulty in melting

stainless, but when stainless scrap is used many problems arise. First, the carbon must be eliminated and melting must proceed under very careful supervision to avoid carbon pick-up. Likewise, to properly utilize alloy residuals, scrap of known analysis must be obtained. Otherwise, bath analysis might show under or over content of specific alloys and operating practice must be adjusted to compensate for the variations. One practice, outlined by Herman Schultz, Carnegie-Illinois Steel Corp., for melting stainless scrap, was to have the melt-down as slow as possible, giving the melt a chance to oxidize more naturally. This can be done best in furnaces where the power input is low. Another practice outlined by Mr. Schultz was to blow oxygen directly on the face of the bath after melting is completed. By doing this, the slag becomes extremely hot and gives up chromium. The use of induction furnaces for this purpose was lauded because of the fact that in this type of melting, the operator gets out of the furnace almost exactly what he puts into it in the way of metal analysis. Furthermore, scrap charges in induction furnaces can vary from practically zero to 100 per cent and alloy losses are negligible. However, the volume of metal produced per heat by the induction furnace is so small that it is difficult to get high production economically.

Refining and Deoxidizing

Refining and deoxidizing was the subject for discussion in the final meeting of the session on basic steel practice. This meeting was under the chairmanship and co-chairmanship of E. C. Smith, Republic Steel Corp., and H. C. Bigge, Bethlehem Steel Co. Harry W. McQuaid, Republic Steel Corp., discussed the fundamentals of deoxidization of basic steel, outlining the general practices in furnace operation after the melt-down. One of the prime requisites to good deoxidization is high bath temperature in order that suspended particles may be eliminated, this being facilitated by the more fluid bath. Low FeO content of the slag is likewise necessary in order to remove iron oxide from the bath, the slag acting like a blotter. Care must be exercised that alloy additions are placed into the bath early so that when silicon is added last, the metal is clean and completely deoxidized.

One practice outlined by Harold Phelps, Rotary Steel Co., aided in re-

removal of oxygen from the bath. On low carbon heats, when ready to slag off, the electrodes are dipped into the bath. By exercising care, this removes the oxygen by a violent boil and the carbon pickup from the electrodes is negligible. The time the electrodes remain in the bath is governed by the length of the boil, and they are removed as quickly as the boil begins to subside. Otherwise, there would be a substantial carbon pickup by the metal from the electrodes.

Other speakers at the afternoon session on basic electric steel making

covered the removal of phosphorus and sulphur; composition and functions of second slags; removal of other non-metallics; temperature control; and other similar phases in electric steel furnace operation. When the meeting was adjourned, it was stated that the Electric Furnace Steel Committee of the Iron and Steel Division of American Institute of Mining and Metallurgical Engineers had decided upon the time of the next electric furnace conference, which will be held at the William Penn Hotel, Pittsburgh, on Oct. 5 and 6, 1944.

• • •

Electrochemists Study Wartime Developments

(CONTINUED FROM PAGE 56)

beaker 1 to 2 in. away from a vertical edge of the cathode. This position causes a thinner deposit on distant than on near points of the cathode, hence a variation in color. Plating should be stopped as soon as the desired colors develop, usually in 60 to 80 seconds. As soon as removed from the bath, the cathode should be rinsed, wiped dry without scratching, then polished with a tuft of absorbent cotton to brighten the colors.

As might be expected, any overplating dims the colors, and heavy plating causes their complete disappearance. Addition to the plating solution of ammonium carbonate as a "conducting salt" widens the bands of

color and enlarges the figure which they form. The largest plating so far produced is a foot square. Lacquering dims the colors.

The first step in preparing a monel plating solution, overcoming the tendency for copper to deposit instead of nickel, was the making of "monel carbonate." For each gallon of solution desired, 8 oz. $\text{NiSO}_4 \cdot 6\text{H}_2\text{O}$ and 0.4 oz. $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ were dissolved, precipitated by sodium carbonate, and washed free from soluble salts. This "monel carbonate" was dissolved in several different solvents and tested for plating with monel. It was found that in alkaline solutions the tendency for deposition of copper instead of nickel

was lowered sufficiently to make monel plating possible. After the solution has been made alkaline by sodium carbonate, and heated to 150 or 160 deg. F., it is ready for use. Plating solutions may be made directly from the sulfates of nickel and copper, but these solutions seemed less satisfactory in operation than when the sulfates are first converted to carbonates before making up the plating solution. When the acetates of nickel and copper are used instead of the sulfates, there is no need of converting these to carbonates before adding to the plating bath.

An increase in the copper content of the deposit occurred with rise in temperature. Stirring of the solution and motion of the cathode while plating has a similar effect. An increase in current density raises the nickel content of the deposit.

A rise in temperature or in copper concentration of the bath requires a higher current density to secure a white plate. Although it is not necessary to exclude sulfates and chlorides from the bath, the author considers it better to do so. Addition of ammonium chloride to a good monel bath did not spoil it, but free cyanide cut current efficiency to the vanishing point. Like other electroplate, monel plate lacks the strength and ductility of the rolled sheet metal.

"Corrosion of Lead-Indium Diffusion Alloys" was reported on by J. M. Freund, H. B. Linford and P. W. Schutz, Columbia University, who sought to verify the occurrence of chemical corrosion of lead and indium plated lead, to determine the extent and products of chemical attack, and the condition under which chemical attack occurs.

In order to study the corrosive effects of hot lubricating oil on steel samples plated with lead, silver and lead, and lead plus indium, the plated steel strips were immersed in lubricating oil maintained at 340 to 355 deg F. under conditions of total reflux. The corrosion was measured by noting the weight loss in the steel samples.

The authors concluded from the investigation that chemical corrosion of lead by lubricating oils occurs; the extent of lead corrosion is apparently not limited by the formation of a protective film. Indium in sufficient amounts is an excellent inhibitor of lead corrosion under severe conditions. Degree of immersion is important in corrosion of this sort. Iron seems to speed up the attack, possibly by galvanic action, and, lead sulfide is one of several corrosion products.

MARINES LAND ON NANUMEA: U. S. Marines made an unopposed landing on Nanumea Island Sept. 4. With destroyers patrolling in the background, a landing ship has nosed into a reef to disgorge its cargo of guns, tanks, tractors and trucks.



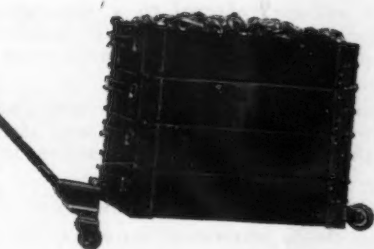
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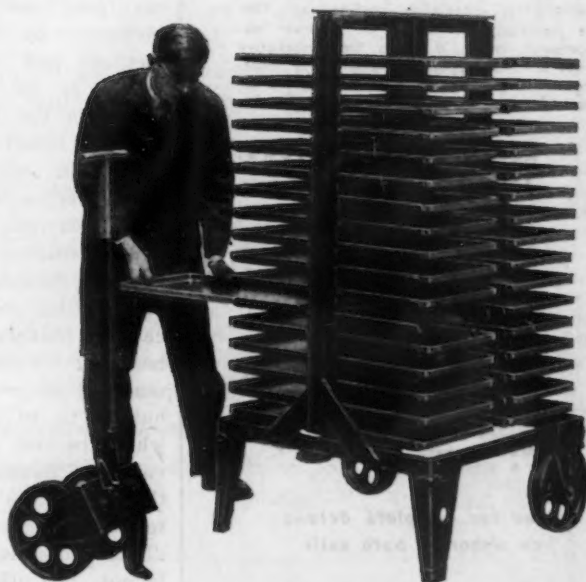


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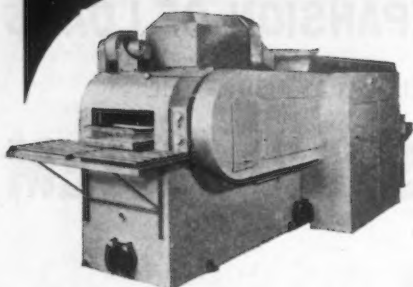
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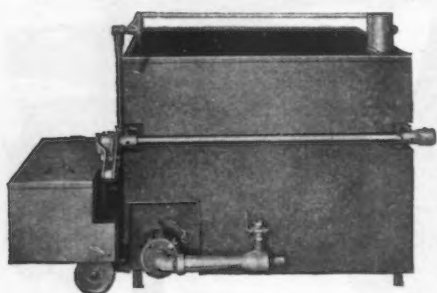
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A small, compact, mechanically simple unit combining ACTIVE-SOAK with WASHING ACTION. Removes oil, grease, chips from metal parts, assemblies, castings, etc. Can be installed individually in different departments or in a series for consecutive steps of cleaning, rinsing, coating or treating. Also the S-B DRYER for complete installation.

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Chain Belt Co., Milwaukee, Wis.
General Motors Installations:
Diesel Div., Detroit, Mich.
Saginaw Gear Div., Saginaw, Mich.
Delco Remy Div. (2) Anderson, Ind.
Timken Bearing Corp.
Wisconsin Axle Div. (4) Oshkosh, Wis.
Aircraft Radio Corp., Wright Field, Ohio
U. S. Naval Air Training, Memphis, Tenn.
McCulloch Eng. (Borg-Warner), Milwaukee, Wis.
Western Electric Co., Clifton, N. J.
Marlin Rockwell, Jamestown, N. Y.
& Others

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WMC Accepts New Buffalo Plan

Buffalo—The first signs of peace since the Buffalo controlled referral hiring plan was put into effect several months ago appeared last week with the acceptance by Mrs. Anna M. Rosenberg, regional director of the War Manpower Commission for New York, of several amendments written by the local area manpower committee.

Major changes in the hiring procedure of the rewritten Buffalo plan are:

1. All male workers seeking full time employment must clear through the USES or bona fide union hiring halls.
2. If a male worker is employed in a non-essential activity and wants to take additional employment, part time or supplementary, in an essential industry he does not have to have a statement of availability but must clear through the USES where he will have the right to select his job.
3. Female workers engaged in one of the 149 critical occupations must go through the USES.
4. Any worker, male or female, who has not lived or worked in the locality of new employment within the last 30 days must go through the USES.
5. All workers changing from essential to non-essential work must go through the USES even if they have statements of availability.
6. Workers going from agriculture to non-agriculture jobs must clear through the USES.

Labor's bitter fight against referral to a job paying less than the worker's previous one was answered in the revised contract which permits an applicant to refuse employment at a wage below that paid for his highest skill.

Workers in the Buffalo-Niagara area now have the right to refuse employment in plants on the priorities list and still be eligible for referral to a job on the list of essential industries or even in "locally needed" work.

The order of referral for a male worker now is:

1. To a job at his highest skill in industries on the priority list in the order of their respective priority ratings.
2. To a job at his highest skill in industries which are essential or locally needed but not on the priority list; or to a job in industries on the priority list in the order of their relative priority where he may use a skill closely related to his highest skill provided wages are equal.
3. To a job in essential or locally needed industries not on the priority list where he may use a skill closely related to his highest skill.

Tool Engineers Examine New Techniques

(CONCLUDED FROM PAGE 47)

Electric & Mfg. Co., in the statement that good tooling is often rendered ineffective by poor material handling methods and poor layout of equipment. In fact, he added that no factor in the industrial field causes greater losses from hidden causes than plant layout. It is one factor that receives the least attention because relatively few people are qualified to evaluate properly the effectiveness of manufacturing layouts. Yet Mr. Mallick pointed out that 22 per cent of industry's payroll goes into handling within the plant, and that material in production is worked on but 35 to 40 per cent of the time while the rest of labor's time is devoted to handling. In some plants, the percentage drops to as low as 15 to 20 per cent. The speaker then illustrated examples of good and bad layout and the various types of material handling equipment used in industry.

He was followed by Ezra W. Clark, vice-president and general manager, Clark Tractor Division, Clark

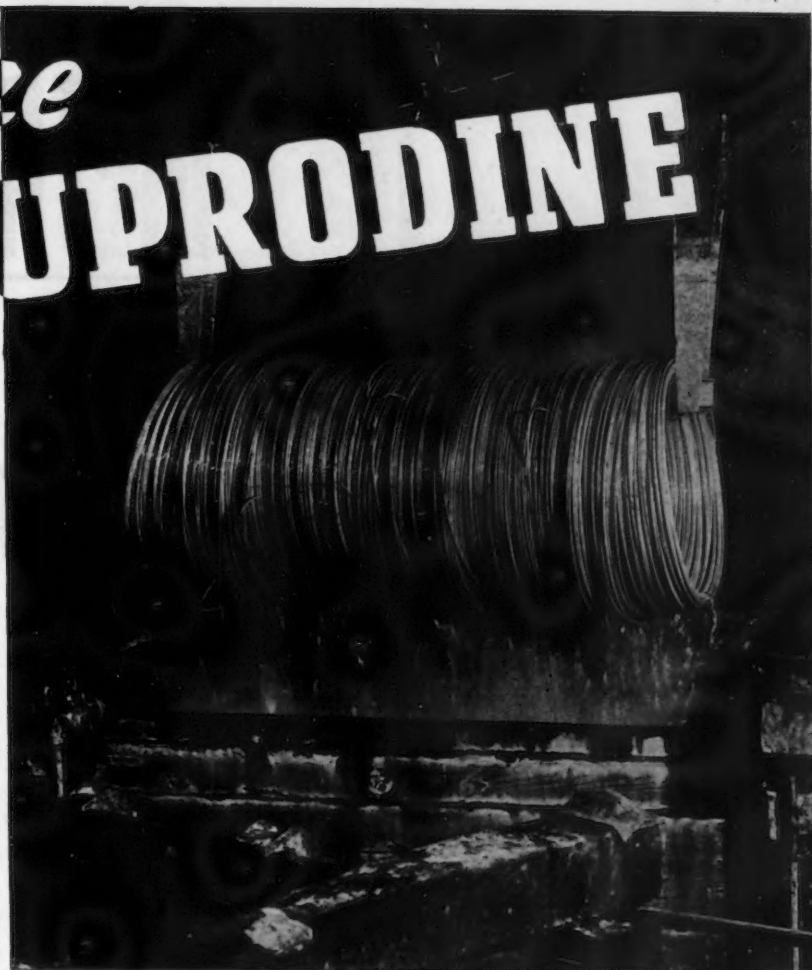
Equipment Co., who spoke on mobile material handling equipment. He stated that the internal freight bill was higher than the national railroad and truck haulage bill and that 75,000,000 tons of raw materials are handled in process in a year. Hence great opportunities present themselves for making savings in this field by the installation of mechanical handling apparatus. Since 40 per cent of the labor in this field is unskilled, he saw an opportunity for retraining and upgrading this vast reservoir of labor by the introduction of more handling machinery.

The case for power driven conveyors was stated by W. V. Casgrain, president, Mechanical Handling Systems, Inc., who showed how conveyors have become integrated into mass production industries like the automotive industry. The adaptation of conveyors is not yet entirely complete, but is being accelerated by war activity. Concrete examples of some late installations were exhibited in a series of lantern slides by L. J. Bishop, vice-president and chief engineer of the same company. One series of pictures showed a completely conveyorized plant for manufacturing bombs from steel tubing.

Cuprodize with CUPRODINE

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Cuprodine increases production by making possible more drafts than could be made with acid copper.

Cuprodine is easy on dies—its use increases die life five to tenfold. Rejects from pickup, scratches and breakage are reduced to a minimum.

These are some of the advantages of Cuprodine, a powdered chemical, with which tight, adherent copper coatings are deposited on clean steel without the use of current.

The general use of Cuprodine in the drawing of steel shell cases as well as in wire mills attests to its advantage.

With proper processing Cuprodized surfaces may be used for decorative purposes.

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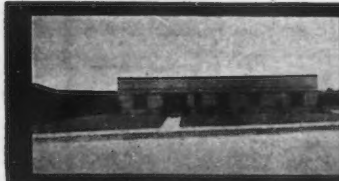
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Metal Specialty's plants are equipped to render you complete service in the fabrication of all Metal Parts, and in Plastic Injection Molding up through 18 ounces per shot. Along with 850-ton self-contained hydraulic presses for Metal Working, Metal Specialty has one of the four 18-36 ounce capacity injection presses for Custom Molding together with full complementary equipment.

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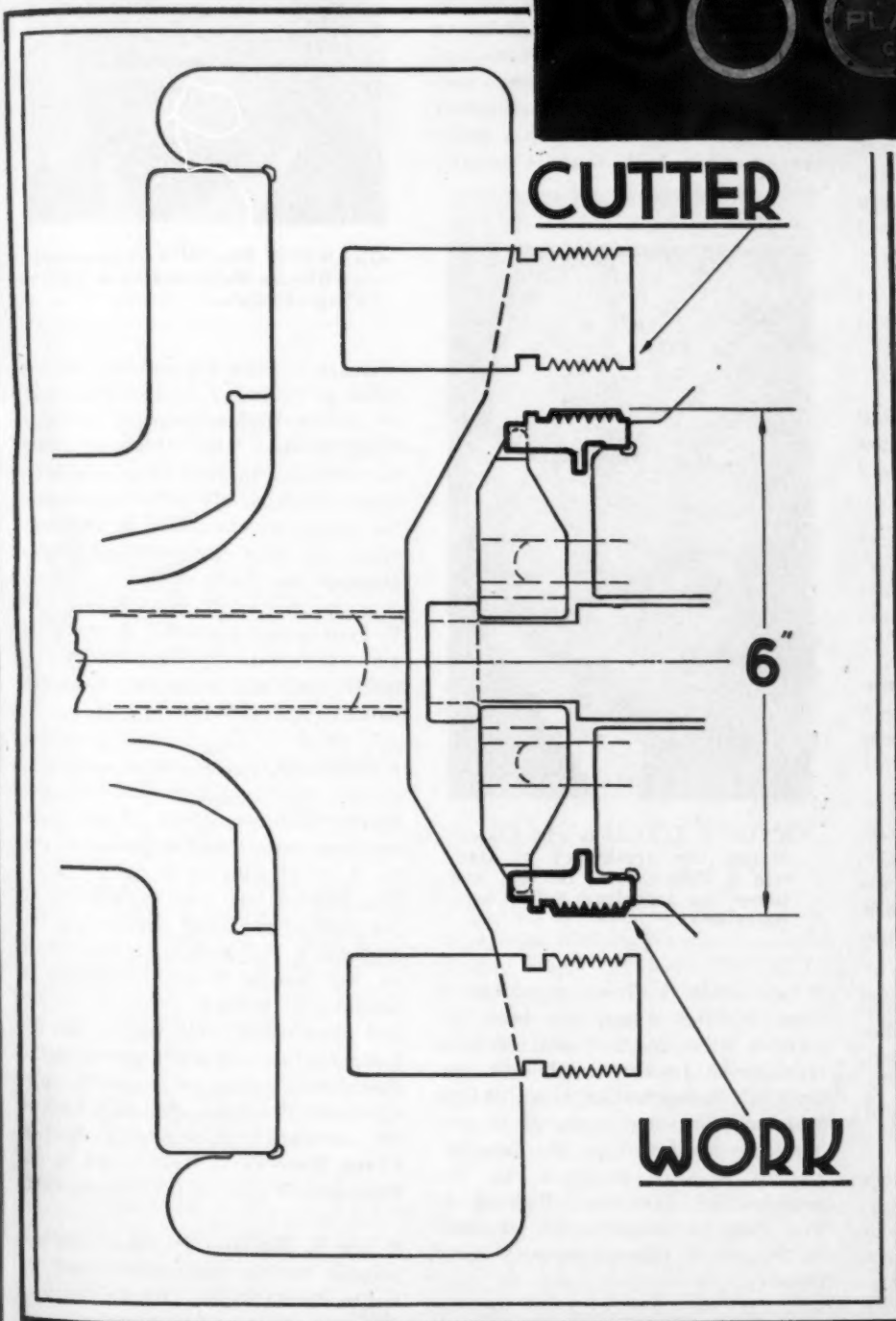
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The Job: Aircraft Propeller parts.

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Production time: 15 minutes, floor-to-floor.

Machine: THE HALL PLANETARY.

Close aircraft accuracy and a very satisfactory rate of production are easily maintained by the use of the Hall Planetary. All external surfaces are simultaneously machined, as indicated by the heavy lines in the drawing. Threads are spotted on this work; and the Hall Planetary features permit the removal of sharp or incomplete threads at both the beginning and end of threaded portion of the work.



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PERSONALS

• **E. R. Dougherty**, former general sales manager of the Chicago Steel Foundry, has joined the sales staff of Michiana Products Corp., Michigan City, Ind. **John H. Staiger** has been appointed to the metallurgical staff of the company.

• **E. A. Stein** has joined the engineering department of the Maysteel Products, Inc., Mayville, Wis.

• **E. Van Vechten** has been made western representative for the Weatherhead Co., Cleveland. His headquarters will be at the company's branch office in Los Angeles.

• **Wm. B. Todd**, representative of the WPB in England, has left Pittsburgh to return to his post at the United States Embassy, in London.

• **Herluf Nielsen** was appointed chief metallurgist in charge of the technical department, Kinney Aluminum Co., Los Angeles.

• **Alfred M. Street** has been appointed publicity manager of Jenkins Bros., New York. He was formerly assistant publicity manager.

• **Paul Mayfield**, director of sales of the naval stores department of Hercules Powder Co., Wilmington, has been appointed assistant general manager.

• **R. J. Minshall**, president and general manager of the Pump Engineering Service Corp., Cleveland, has been appointed president of the McCulloch Engineering Corp., Milwaukee.

• **Leon P. Goodspeed**, formerly vice-president of Henry Prentiss & Co., West Hartford, Conn., has joined the Rudel Machinery Co., Inc., New York, as supervisor of their Connecticut territory.

• **Jerome F. McGee**, former assistant manager of sales in the Milwaukee office of Carnegie-Illinois Steel Corp., has been appointed manager of refractory material sales for the Ray J. Moths Co., Milwaukee.

• **Herman J. Schorie** has been made assistant works manager of the Holyoke Compressor & Air Tool Division of the Worthington Pump & Machinery Co.; **George E. Salesky** production manager; **Otto J. Schorer** engineer in charge of air tool department; **Warren A. Stewart** engineer in charge of compressor department; and **Fred G. Riedel** engineer in charge of refrigeration and air conditioning department.

• **Floyd H. Stroup** has been appointed metallurgical engineer for the Ohio-Ferro Alloys Corp., Canton, Ohio. He was formerly connected with the Central Steel Co. and Republic Steel Corp. Massillon, Ohio, on slag research.

• **L. I. Woolson** has been named factory manager of DeSoto plant of Chrysler Corp., Detroit. Mr. Woolson was formerly chief engineer.

• **Victor F. J. Tlach** has resigned as president of Darwin & Milner, Inc., Cleveland, after holding the position for nearly 30 years. He is well known as a pioneer of high carbon-high chromium tool steels, having been connected with their original discovery at Sheffield, England. He has joined the American Agile Corp., Cleveland.



VICTOR F. J. TLACH who has resigned the presidency of Darwin & Milner, Inc., Detroit, and joined the American Agile Corp., Cleveland.

• **Courtlandt S. Gross**, president of Vega Aircraft Corp., has been appointed vice-president and general manager of Lockheed. He will continue his former office also. **Harris McIntosh**, formerly in charge of production control at Vega has been appointed special assistant to the president of Lockheed. **Richard A. Von Hake**, Lockheed's vice-president in charge of manufacturing retired October 1.

• **Henry C. Manecke**, assistant manager and secretary-treasurer of the Wausau Iron Works, Wausau, Wis., has announced his retirement, but will retain his directorship and financial interest.



GRANT S. DIAMOND, president of Electro Refractories & Alloys Corp., Buffalo.

• **Grant S. Diamond** succeeds the late Luke U. Milward to the presidency of Electro Refractories & Alloys Corp., Buffalo. Mr. Diamond joined the company in 1923 as assistant research chemist. In 1932, he assumed the vice-presidency, and in 1941 was made executive vice-president. **Philip Donham** has been elected vice-president in charge of finance and **Carl F. Leitten** vice-president in charge of manufacturing. **William Enslin**, formerly assistant treasurer, has been named secretary.

• **Carl Luth**, who has been serving as acting chief engineer at Duquesne Works, Carnegie-Illinois Steel Corp., has been made chief engineer at this U. S. Steel subsidiary plant. **J. N. Von Behren** has been transferred to the staff of the chief engineer of the company's Pittsburgh district, where he will handle special assignments. **Gustave G. Erland**, assistant project and presentation engineer of the defense engineering staff, moves to the Duquesne Works as assistant chief engineer. From the operating staff of the company's Youngstown district, **Frank Hovorka** is transferred to the Duquesne Works as project engineer.

• **Lee S. Sinclair, Jr.**, has been appointed to the laboratory staff of Kelite Products, Inc. He will work at the main plant in Los Angeles.

• **Andrew B. Sides** has been made executive vice-president of the New England Shipbuilding Corp. He was formerly secretary of the company.



DOROTHY M. J. TRACEY, vice-president and manager of Tomkins-Johnson Co., Jackson, Mich.

• **Dorothy M. J. Tracey**, vice-president of Tomkins-Johnson Co., Jackson, Mich., has been appointed general manager. Mrs. Tracey has served for a number of years as purchasing agent, before her advancement to vice-president in 1939.

• **J. B. Macauley, Jr.** has joined the engineering dept. of Pratt & Whitney Aircraft Division of United Aircraft Corp., East Hartford, Conn.

• **Harry M. Clarke** has joined Bliss & Laughlin, Inc., Harvey, Ill., as metallurgical engineer covering that district. **Karle D. Meyer** has been named mechanical engineer for the firm, serving both the Harvey and Buffalo, N. Y., plant.

• **Richard T. Nalle**, vice-president and plant production manager of Henry Disston & Sons., Inc., Philadelphia, was elected a director of the Baldwin Locomotive Works and a member of its executive committee.

• **Miller G. Robinson** has been appointed manager of engineering service of the paint division of Aluminum Industries, Inc., Cincinnati.

• **E. B. Frock** has been elected secretary of the Hanover Wire Cloth Co., Hanover, Pa. Mr. Frock was formerly production manager and will continue to control production.

• **Charles B. McCoy** has been named director of sales of the explosives division, E. I. du Pont de Nemours & Co., Wilmington, Del. **Samuel G. Baker** has been made director of the electroplating division.

• **C. A. Priest** has been appointed manager of the transmitter division, electronics department, General Electric Co., Schenectady. **Howard W. Bennett** has been made manager of the specialty division of electronics department.

• **Bertram M. Brock** has been made manager of the newly created industrial relations department of the Continental Can Co., Inc., New York.

• **Joseph P. McGough** has been appointed manager of the Cleveland plant of Joseph T. Ryerson & Son, Inc., taking the place of **Fred Doran**, who moved to Chicago some time ago as vice-president of the company.



D. EARL McELROY, special mill representative on the Pacific Coast for Lukens Steel Co. and subsidiaries, Coatesville, Pa.

• **D. Earl McElroy** has been appointed special mill representative on the Pacific Coast for Lukens Steel Co. and subsidiaries, Coatesville, Pa. In his position as special mill representative, Mr. McElroy will act in a liaison capacity between the Lukens companies and C. T. Hansen & Company, Pacific Coast sales representative of Lukens.

• **A. Amundsen**, works manager of Wright Aeronautical Corp. for the past 10 years, has been named manager of that organization's newest plant "somewhere in northern New Jersey."

• **James L. Morrison**, president of the Morrison Machine Co., Paterson, N. J., has been made a director of the White Aircraft Corp.

OBITUARY...

• **William Herbert Hatfield**, director of Thomas Firth & John Brown, Ltd., and Firth Vickers Stainless Steels, Ltd., Sheffield, England, died Oct. 17. Dr. Hatfield was the Campbell Memorial Lecturer in Philadelphia in 1930, and was awarded the Bessemer Gold Medal of the Iron and Steel Institute in 1933. He was 61 years of age.

• **Frederick A. Darling**, sales manager of the New England Coke Co., died Oct. 1. He had been with the concern for 20 years. Mr. Dowling was 58 years of age.

• **George T. Howard**, sales engineer handling small tools and gages for Pratt & Whitney, died recently. He was located at the company's Chicago office.

• **Carl Edvard Johansson**, inventor of the microgage and of the Johansson blocks, died recently in Elkistuna, Sweden. During World War I Mr. Johansson worked at the Ford Motor Co., to whom he sold the manufacturing rights for his blocks. He was 79 years of age.

• **Daniel Merrick Wheeler**, inventor of the steel measuring tape, died Sept. 29 at Pittsfield, Mass. He was 97 years of age.

• **Charles Henry Sherburne**, president of the Star Brass Mfg. Co., died in Boston, Sept. 29.

• **George L. L. Davis**, vice-president in charge of sales of the Scullin Steel Co., St. Louis, was killed by an accident while on a private tour of inspection of the company's plant. He was 67 years of age.

• **Robert H. Gill**, purchasing agent of Wolverine Tube Division of Calumet and Hecla Consolidated Copper Co., Detroit, died Oct. 10. Mr. Gill was an employee of Wolverine Tube for 14 years. He was 53 years old.

• **William R. Beatty**, president of the Beatty Machine & Mfg. Co., Hammond, Ind., died Sept. 8. Mr. Beatty, who helped found the machine company 26 years ago, was 66 years of age.

• **Charles F. Gildon**, well known steel engineer with the Globe Steel Tubes Co., Milwaukee, died Oct. 5. He had been with Globe Steel for five years.

MACHINE TOOLS

... News and Market Activities

Machine Tool Drop Being Cushioned

(CONTINUED FROM PAGE 90)

machines required to be built, together with some form of governmental underwriting of inventory, could be worked out in order to provide sufficient machine tool production for war requirements and to give protection against cancellation. Because, by their nature, machine tool cancellations, particularly for small contracts, often must progress through many layers of sub-contractors before reaching the tool manufacturer, he urged clarification of the whole cancellation picture with the development of a cancellation clause which would meet the conditions of the industry and avoid multitudinous detail and red tape entanglements.

In the background so far as public sessions were concerned, but casting a constant shadow over the delegates, was the question as to what disposal would be made of government-owned machine tools. The Association's planning committee is studying this problem.

Another major question in behind-the-scenes discussion was that of renegotiation. The extent to which renegotiation peculiarly affects the machine tool industry was dealt with last month in a brief prepared by the Association for presentation to congressmen, senators, and the general public.

Some actual relief in the renegotia-

tion problem was hinted at by Mr. Tangeman who said, "It is at least encouraging to note that the House Ways and Means Committee will recommend some changes in the renegotiations law."

Tell Berna, general manager of the Association, drove home the growing importance of uniform contract termination procedure, as reported in last week's issue, page 125. To date, cancellations have not immediately drawn blood from the manufacturers, because the machine tool builders prescribed method of distribution provides that cancelled machines go back into the pool from which the various manufacturers are assigned orders. This pool, which represents the industry's backlog, is evaporating rapidly. According to Mr. Chafee, as of September, \$1,863,641,000 of pool orders authorized since Feb. 1, 1941, had been shipped or assigned, except \$83 million of which \$6 million worth has been completed and is in Defense Plant Corporation storage. In terms of machines, Mr. Berna declared that only 9500 unassigned machines were in pool orders in August, and that the industry sold 9700 machines that month and shipped 17,000. From now on, a system of "continuity orders" is needed.

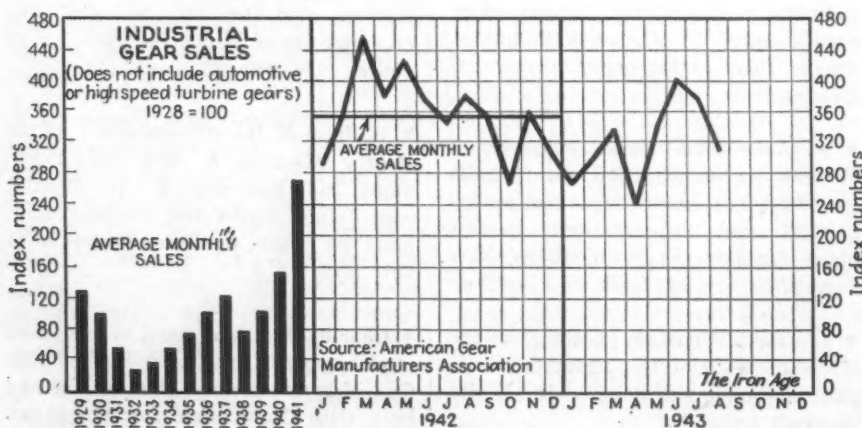
Looking to the post-war period, F. V. Geier, president, Cincinnati Milling Machine Co., discussed the direction in which the Association's committee on planning is working. He said that attention was being given to the following questions:

1. How many months before industry can re-employ war veterans and displaced war workers must engineers be made available for design, planning and process engineering of products for peace time?
2. How long before the return home of our soldiers, sailors, and flyers must orders be placed to design and build machine tools to re-tool peace-time production?
3. What determination of government policy regarding government-owned plants and equipment must be made before widespread peace-time reemployment is practical?
4. Would it be in the national interest to greatly broaden technical skill and training through generally equipping all technical and secondary schools with government surplus equipment?
5. As the armed services make plans to safeguard the future of the nation, through provision for war materiel reserves, and plan reserve facilities, how can we make our experience in this war most helpful to them?
6. What helpful guidance can we gain through a study of the experience in the World War I transition from war to peace?
7. In striving for this post war goal for national employment and production, do machine tool builders realize that they have more to contribute, and more to gain, than any other group? The most productive machines and cost-cutting methods in history must be developed by us, if America is to have jobs for 56,000,000 and production income of \$135 billion. But if we can help achieve this great goal, if we can help build an industry of this extent, we will have as our enduring reward an American market far sounder, far larger and far better able to support and develop our machine tool industry, than ever before in the history of America.

Officers elected by the Association for the 1943-44 term are: president, James Y. Scott, president, Van Norman Co., Springfield, Mass.; first vice-president, Joseph L. Trecker, vice-president, Kearney & Trecker Corp., Milwaukee; second vice-president, William P. Kirk, vice-president and sales manager, Pratt & Whitney Division, Niles - Bement - Pond Co., West Hartford, Conn.; and treasurer, E. Blakeney Gleason, vice-president, Gleason Works, Rochester, N. Y. Elected to serve with these officers as directors were C. N. Kirkpatrick, president and general manager, Landis Machine Co., Waynesboro, Pa.; Walter W. Tangeman, vice-president, Cincinnati Milling Machine Co., Cincinnati; Albert H. Eggers, president, Greenlee Bros. & Co., Rockford; Fred H. Chapin, president, the National Acme Co., Cleveland; and R. E. LeBlond, the R. K. LeBlond Machine Tool Co., Cincinnati.

Gear Sales Down 16.5 Per Cent in August

... The gearing industry as represented by the members of the American Gear Manufacturers Association shows a decrease of 16.5 per cent in the business booked in August, as compared with July. The August index figure was 312 as compared with 374 for July.



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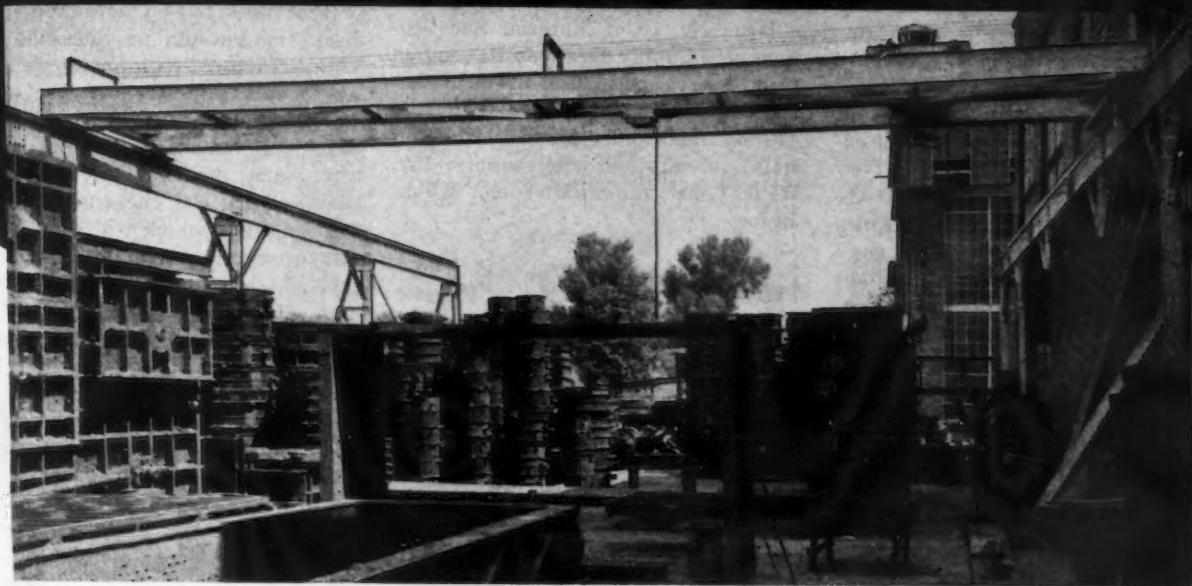
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In converting for war, many plants—particularly those of small or medium size—were compelled to sacrifice production economies in the interest of frantic speed. That is always the case in war.

But when these plants convert back to peace and face terrific competition in postwar production they will have to cut manufacturing costs and still maintain a volume output. R & M Cranes can help them.

Regardless of your industry, R & M Cranes can effect definite important savings by making possible the faster, more efficient handling of loads in your plant or yard. They can eliminate all re-handling in lifting, moving and placing, prevent bottlenecks at many points and slash

labor costs to the minimum.

Now, while you are carefully planning your setup for postwar manufacture, is the time to have an R & M Hoist & Crane expert make a survey of your needs. No obligation is incurred and it may mean much to you. Depending on the size of the cranes you need, we can make delivery in 3 to 6 months. And whichever model you choose—from ½ ton to 25 tons in capacity—you have absolute assurance of traditional R & M performance, dependability and economy.

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NON-FERROUS METALS

... News and Market Activities

WPB Drops Aluminum Expansion Plan

• • • Because the supply of aluminum has eased sufficiently in recent months, WPB has decided to drop plans for erecting additional production facilities in New York and Philadelphia.

The program which was mapped last summer contemplated erection of an aluminum reduction plant of four to five pot lines having an annual capacity of 87,500 net tons. The New York plant would have employed approximately 1000 workers and its site had already been selected although proceedings for its acquisition had not been instituted.

One large plant is already in operation in Maspeth, Queens, and the new project was intended to expand the plant's output.

Non-Ferrous Supply Eases

• • • A market easing of ferro-alloys and many nonferrous metals was evidenced in the 10th Material Substitutions and Supply List, issued by WPB.

The list, prepared by the WPB Conservation Division, groups the materials most essential to the war program in three categories on the basis of their current availability: Group I materials in insufficient supply to satisfy essential war demands; Group II materials in sufficient supply to meet war needs and Group III materials in excess of essential needs and recommended as substitutes for scarcer materials.

"The easing of many nonferrous metals and ferro-alloys is not an indication that restrictions on their use can be lifted or that any of them will be available soon for general use," Howard Coonley, director of the Conservation Division, pointed out. "The shift to Group II is significant chiefly because these materials in unfabricated form are now sufficient to supply essential war and industrial needs."

Because it no longer serves its original purpose, the Supplementary List on the last page of Issue No. 9 has been discontinued. This list consisted of items on which inventory restrictions had been eased.

To further the practice of substituting secondary alloys for more critical grades of material, the Conservation Division has prepared two charts for distribution: "Conservation Chart for Brass and Bronze," newly reissued,

and "Aluminum Alloy Substitution Chart." Copies of these charts may be obtained upon written request to the Conservation Division, War Production Board, Washington 25.

Issue No. 10 of Material Substitutions and Supply List may be secured from the regional offices of WPB. Requests for large quantities of the list will be handled by the editor, materials substitution and supply list, WPB Conservation Division, Washington.

Canadian Plans for Postwar

Toronto

• • • Dr. Lloyd M. Pidgeon, recently appointed to head Metallurgical Engineering at the School of Science, University of Toronto, has assumed the task of developing more diversified use in the postwar period for war-expanded production of light metal alloys. Recognized as one of Canada's leaders in research on metals, Dr. Pidgeon evolved the process for extracting metallic magnesium from native materials which resulted in the establishment of the 10-ton per day plant near Renfrew, Ont., and which is now used in five plants in the United States. No other metal has received as much attention in this country.

The extensive use of magnesium, and its production in Canada as an important part of Canada's contribution to the war effort, has led to new possibilities of this metal for peacetime. It is Dr. Pidgeon's idea that the light and fine alloys will have a dominating position in the future industrial life of Canada. The war's need of volume production of such things as aircraft has resulted in the training of a great many workmen in the handling and use of these metals. Until only shortly before the war, much of the industry's production methods were based on the custom of using weight to get strength—heavier castings to obtain rigidity. Good examples of this are the heavy castings in farm machinery, portable machine tools and typewriters. Dr. Pidgeon believes that if this need for lightness continues, and there is every reason to believe it will, magnesium may continue a volume product and not collapse as it did after the last war. In

the present war magnesium came into its own as a structural metal, in addition to its great use in incendiary or pyrotechnic manufacturing, bombs, flares, etc.

Forty per cent lighter than aluminum, costing at present more on a weight basis, but no more on a volume basis, magnesium provides the most rigid structures with lowest weight of any metal. In the post war period, Dr. Pidgeon said, its struggle for a place in industry will be against aluminum, nickel-chrome steels and plastics. Each of these possesses certain qualities which will compel their use for certain products; all will overlap, at which point the economics of cost enter into the selection of the product. Technologically, there should be no great difference between the cost of aluminum and magnesium, Dr. Pidgeon believes, and each will remain paramount for certain uses. For instance, he said, magnesium will never go into pots and pans, because even boiling water affects it; on the other hand a 40 per cent bigger casting for such products as aircraft landing wheels or motorcar housings could be made from magnesium without increasing weight. The need for rigidity with light weight creates a need for such a light metal as magnesium if its cost does not render its use uneconomical, Dr. Pidgeon explained. Dr. Pidgeon continued:

"My desire is to continue research on the production and properties of light metals. Today we have a productive capacity of good light metals, and metallurgists naturally hope it will not lapse. Germany was in an advanced position when war started; she had produced and used magnesium for years, had a productive source when she needed it. But we don't subsidize any metals in peacetime. They have to pay their way by an actual required use and by low enough cost to be economically available."

Japan Expands Light Metal Output

• • • The Mitsubishi organization will take over direction of the Japanese aluminum company, will erect several magnesium plants and will begin the manufacture of duraluminum, the Berlin radio reported according to the United Press monitor. In addition, the company will increase the output of its machine tool plants.

NON-FERROUS METALS

Refiner, Smelter Quotations

(Cents per lb.)

Copper, electrolytic, Conn. Valley.....	12.00
Copper, electrolytic, New York.....	11.75
Copper, Lake.....	12.00
Tin, Straits, New York.....	52.00
Zinc, East St. Louis.....	8.25
Zinc, New York.....	8.67
Lead, St. Louis.....	6.35
Lead, New York.....	6.50
Aluminum, virgin 99+%, delivered.....	15.00
Nickel, electrolytic, base refinery.....	35.00
Magnesium, 99.9+%, carlots.....	21.50
Magnesium, 12-in. sticks, carlots.....	30.00
Cadmium, delivered.....	90.00

ALUMINUM, N^o 12 foundry grade (No. 2), 13.50c. per lb.; steel deoxidizing grades, 12.50c. to 13.75c. per lb. **ANTIMONY**, Asiatic, New York, nominal; American, 14.50c. a lb., f.o.b. Laredo, Tex., smelter. **MERCURY**, \$191 to \$193 per 76-lb. flask, f.o.b. shipping point or port of entry. **BRASS INGOTS**, commercial 85-5-5-5 (No. 115), 12.25c. a lb. **COBALT**, 97 to 99 per cent, \$2.11 per lb. **BERYLLIUM COPPER**, 3.75 to 4.25 per cent Be., \$15 per lb. contained Be. **GOLD**, U. S. Treasury, \$35 an oz. **INDIUM**, 99.5 per cent, \$10 per troy oz. **IRIDIUM**, \$165 per troy oz. **PALLADIUM**, \$24 per troy oz. **PLATINUM**, \$35 per oz. **SILVER**, open market, New York, 44.75c. per oz. **ARSENIC**, prime, white, 99 per cent, 4c. per lb.

Copper, Copper Base Alloys

(Mill base prices)

Sheet: Copper, 20.87c.; high brass, 19.48c.; low brass, 80 per cent, 20.15c.; red brass, 85 per cent, 20.36c.; commercial bronze, 90 per cent, 21.07c., 95 per cent, 21.28c.; manganese bronze, 28.00c.; Muntz metal, 22.75c.; naval brass, 24.50c.; phosphor bronze, grades A, B, 5 per cent, 36.25c.; Everdur, Herculey, Olympic or equivalent, 26.00c.; nickel silver, 5 per cent, 26.50c.

Rods: Copper, hot rolled, 17.37c.; drawn, 18.37c.; free cutting brass, 15.01c.; low brass, 80 per cent, 20.40c.; red brass, 85 per cent, 20.61c.; commercial bronze, 90 per cent, 21.32c., 95 per cent, 21.53c.; Muntz metal, 18.87c.; naval brass, 19.12c.; phosphor bronze, grades A, B, 5 per cent, 36.50c.; Everdur, Herculey, Olympic or equivalent, 25.50c.; nickel silver, 5 per cent, 28.75c.

Extruded Shapes: Copper, 20.87c.; architectural bronze, 19.12c.; manganese bronze, 24.00c.; Muntz metal, 20.12c.; naval brass, 20.37c.

ALUMINUM

Tubing: 2 in. O.D. x 0.065 in. wall 2S, 40c. per lb. (1/2 H); 52S, 61c. (O); 24S, 67 1/2c. (T).

Plate: 0.250 in. and heavier; 2S and 3S, 21.2c. per lb.; 52S, 24.2c.; 61S, 22.8c.; 24S, 24.2c.

Flat Sheet: 0.188 in. thickness; 2S and 3S, 22.7c. a lb.; 52S, 26.2c.; 61S, 24.7c.; 24S, 26.7c.

2000-lb. base price for tubing; 30,000-lb. base price for plate, flat stock. Variations from the above gage, size, temper, finish and quantity require extras.

Extruded Shapes: "As extruded" temper; 2000-lb. base price. 2S and 3S, factor No. 1 to 4, 25.5c. per lb.; 14S, factor No. 1 to 4, 35c.; 17S, factor No. 1 to 4, 41c.; 24S, factor No. 1 to 4, 34c.; 53S, factor No. 1 to 4, 28c.; 61S, factor No. 1 to 4, 28 1/2c.

The factor is determined by dividing perimeter of shape by the weight per lineal foot. All prices above are subject to factor number range, temper, length, dimensional tolerances and quantity extras.

Wire, Rod and Bar: Base price; 17ST and 11ST-3, screw machine stock. Rounds: 1/4 in., 28 1/2c. per lb.; 1/2 in., 26c.; 1 in., 24 1/2c.; 2 in., 23c. Hexagonals: 1/4 in., 34 1/2c. per lb.; 1/2 in., 28 1/2c.; 1 in., 25 1/2c.; 2 in., 25 1/2c. 2S, as fabricated, random or standard lengths, 3/4 in., 24c. per lb.; 1/2 in., 25c.; 1 in., 24c.; 2 in., 23c. 24ST, rectangles and squares, random or standard lengths. 0.093-0.187 in.

thick by 1.001-2.000 in. wide, 33c. per lb.; 0.751-1.500 in. thick by 2.001-4.000 in. wide, 29c.; 1.501-2.000 in. thick by 4.001-6.000 in. wide, 27 1/2c.

Variation from the above size, temper, finish and quantity require extras.

NON-FERROUS SCRAP METAL QUOTATIONS

Copper, Copper Base Alloy

(Current OPA maximum prices, cents per lb., f.o.b. point of shipment, plus premiums for quantities and special preparation.)

OPA Group 1

No. 1 wire, No. 1 heavy copper..	9.75
No. 1 tinned copper wire, No. 1 tinned heavy copper.....	9.75
No. 2 wire, mixed heavy copper.....	8.75
Copper tuyeres.....	8.75
Light copper.....	7.75
Copper borings.....	9.75
Lead covered copper wire, cable..	6.00*
Lead covered telephone, power cable.....	6.04
Insulated copper.....	5.10*

OPA Group 2

Bell metal.....	15.50
High grade bronze gears.....	13.25
High grade bronze solids.....	11.50*
Low lead bronze borings.....	11.50*
Babbitt lined brass bushings.....	13.00
High lead bronze solids.....	10.00*
High lead bronze borings.....	10.00*
Red trolley wheels.....	10.75
Tinny (phosphor bronze) borings.....	10.50
Tinny (phosphor bronze) solids.....	10.50
Copper-nickel solids and borings.....	9.25
Bronze paper mill wire cloth.....	9.50
Aluminum bronze solids.....	9.00
Soft red brass (No. 1 composition).....	9.00
Soft red brass borings (No. 1).....	9.00
Gilding metal turnings.....	8.50
Unlined standard red car boxes.....	8.25
Lined standard red car boxes.....	7.75
Cocks and faucets.....	7.75
Mixed brass screens.....	7.75
Red brass breakage.....	7.50
Old nickel silver solids, borings.....	6.25
Copper lead solids, borings.....	6.25
Yellow brass castings.....	6.25

OPA Group 3

Yellow brass soft sheet clippings.....	8.625
Yellow rod brass turnings.....	3.375
Zincy bronze borings.....	8.00
Zincy bronze solids.....	8.00
Fired rifle shells.....	8.25
Brass pipe.....	8.00
Old rolled brass.....	7.75
Admiralty condenser tubes.....	8.00
Muntz metal condenser tubes.....	7.50
Plated brass sheet, pipe reflectors.....	7.50
Manganese bronze solids.....	7.25 ¹
	6.25 ²
	6.50 ¹
	5.50 ²
Manganese bronze borings.....	

OPA Group 4

Automobile radiators.....	7.00
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OPA Group 5

Refinery brass.....	5.00*
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*Price varies with analysis. ¹Lead content 0.00 to 0.40 per cent. ²Lead content 0.41 to 1.00 per cent.

MAGNESIUM

Sheet, rod, tubes, bars and extruded shapes are subject to individual quotation. Magnesium Metal Turnings: 100 lb. or more, 46c. a lb.; 25 to 90 lb., 56c.; less than 25 lb., 66c. a lb.

Aluminum

(Current OPA maximum prices, cents per lb., for less than 1000 lb. lots, f.o.b. point of shipment, plus premiums for quantities and special preparation.)

Plant scrap, segregated

2S solids.....	9.00
All other solids.....	8.50
Borings and turnings.....	
Wrought alloys (17S, 18S, 32S, 52S).....	7.50
High grade alloys.....	7.00
Low grade alloys.....	6.50

Plant scrap, mixed

All solids.....	7.50
Borings and turnings.....	5.50

Obsolete scrap

Pure cable.....	9.00
Old sheet and utensils.....	7.50
Old castings and forgings.....	8.00
Pistons, free of struts.....	8.00
Pistons, with struts.....	6.00
Old alloy sheet.....	7.00

For lots of 1000 to 19,999 lb., add 1c. to above prices except for old castings and forgings, pistons free of struts, pistons with struts and old alloy sheet for which there is a premium of 1/4c. a lb. For lots over 19,999 lb. add 1 1/2c. a lb. to prices listed.

Magnesium

Segregated plant scrap

Pure solids and all other solids, exempt	
Borings and turnings.....	8.00

Mixed, contaminated plant scrap

Grade 1 solids.....	11.00
Grade 1 borings and turnings.....	7.00
Grade 2 solids.....	9.00
Grade 2 borings and turnings.....	5.00

For lots over 1499 lb. add 1c. per lb.

Zinc

(Current OPA maximum prices, cents per lb., f.o.b., shipping point.)

New zinc clippings, trimmings.....	7.25
Engravers', lithographers' plates.....	7.25
Old zinc scrap.....	5.75
Unswaged zinc dross.....	5.80
Die cast slab.....	5.80
New die cast scrap.....	4.95
Radiator grilles, old and new.....	4.95
Old die cast scrap.....	4.50

Lead

Soft and hard lead, including cable lead, f.o.b. point of shipment, deduct 0.55c. per lb. from basing point prices for refined metal.

Nickel

Nickel content 98 + per cent, copper under 1/2 per cent, 26c. per lb.; 90 to 98 per cent nickel, 26c. per lb. contained Ni.

ELECTROPLATING ANODES AND CHEMICALS

Anodes

(Cents per lb., f.o.b. shipping point)

Copper: Cast, elliptical, 15 in. and longer.....	25 1/4
Electrolytic, full size.....	22 1/2
cut to size.....	30 1/4
Rolled, oval, straight, 15 in. and longer.....	23 1/4
Curved.....	24 1/4
Brass: Cast, 82-20, elliptical, 15 in. and longer.....	23 1/4
Zinc: Cast, 99.99, 16 in. and over.....	16 1/4
Nickel: 99% plus, cast.....	47
Rolled, depolarized.....	48
Silver: Rolled, 999 fine per Troy (1-9) oz., per oz.....	58

Chemicals

(Cents per lb., delivery from New York)

Copper cyanide, tech., 100-lb. bbls. 1-5.....	5.65
Copper sulphate, 99.5 crystals, bbls.....	13.00-13.50
Nickel salts, single, 425-lb. bbls.....	34.00
Silver cyanide, 100 oz. lots. 40.82-41.125.....	
Sodium cyanide, 96% dom., 100-lb. dms.....	0.15
Zinc cyanide, 100-lb. dms.....	33.00
Zinc sulphate, 39% crystals, bbls.....	6.80

SCRAP

... News and Market Activities

Battlefield Scrap a Safety Problem

••• Battlefield scrap has presented a considerable safety problem to at least one concern despite the general belief that military assorting yards are segregating all dangerous scrap before shipment to mills is permitted. This information came to light through experiences published by American Rolling Mill Co.'s Butler, Pa., plant.

Shells and flares which they received that could be opened proved to be empty but some couldn't be opened . . . and left a doubt. Airplane engine valves were found to have

A roundup of the scrap drive outlook and the factors holding up its progress appears on page 83.

been made with a sodium paste core, originally intended to liquefy at en-

gine operating temperatures and act as a cooling agent, but which would explode under the heat of a torch or present the possibility of an explosion.

One set of submarine identification flares received in a scrap shipment proved to be partially filled with what looked like sand. It was sand but kept the scrap yard jittery.

Battered aircraft engines present the possibility of a brisk fire or an explosion when a torch is applied to magnesium alloy castings, the company found. If the material is aluminum though, the torch is safe enough and exceptionally speedy. The company said, probably with a sigh of relief, that battlefield scrap was not being received in sufficient volume to seriously delay scrap yard efficiency.

Jack Levand, Luria Bros. & Co., Cleveland; treasurer, Browne A. Shapero, Max Friedman Co., Cleveland; secretary, Joseph B. Horwitz, Joseph B. Horwitz Co., Cleveland.

PHILADELPHIA—One mill in this district which had not been accepting scrap shipments for several months has now released its embargo which means that scrap shipments here will be spread thinner since there has been no increase in supply. There has been no change in the alloy and cast scrap situation but turnings are becoming a little freer.

NEW YORK—There is very little activity here this week. The canal season is almost over and very little scrap is expected to be shipped by rail to Buffalo except on allocation. The alloy situation is still the greatest headache with no aspirin coming as yet from WPB.

BIRMINGHAM—Open hearth grades moving from local points are being readily accepted but there is no movement whatever from remote areas due to high freight rates and large mill inventories. Electric furnace and cupola grades of steel scrap cannot be sold due to large inventories.

CINCINNATI—The market shows relatively no change during the past week. All good grades of scrap are finding warm reception from consumers, but alloy grades continue to be an extreme problem, primarily because of the price situation. Movement through the yards continues to be slowed down by lack of ample labor, but dealers indicate that they have been able to supply current needs. Current demand has been up for the past two or three weeks.

BOSTON—The generally anticipated after Labor Day pickup in business has failed to materialize. Yards and brokers continue to say things are very quiet. The trade is scrap conscious, however, due to official efforts to drum up interest in the drive. The 2000 tons of battlefield scrap recently sold has not arrived in the United States as yet. Movement of shipyard scrap is down from the 1943 peak, but a Rhode Island mill is getting plate scrap in fair quantities.

BUFFALO—Four barge loads of scrap estimated at 2000 tons arrived by canal from New York City this week and were unloaded at the docks of the district's largest consumer. Other barges were reported progressing slowly in the canal but no down-lake shipments were in sight. Although complaining No. 1 and No. 2 open hearth scrap was "very tight," mills admitted stockpiles remained in good shape. The Western New York Chapter announced it would be host to the national directorate of the Scrap Iron and Steel Institute here this week. All national officers are expected.

Scrap Institute Chapters Elect Officers

Philadelphia

••• All officers of the local chapter of the Institute of Scrap Iron & Steel, Inc., were re-elected at a meeting of the chapter held Oct. 12, here.

The officers for the coming year are:

President, Harry A. Kirchmann, of Allegheny Iron & Metal Co.; vice-president, Samuel J. Abrams, of Abrams Metal Co.; secretary, Marcus J. Margulies, of A. M. Wood & Co., Inc.; treasurer, Harry Stave, of Stave Brothers, all of Philadelphia.

The executive committee members are: Philip Bailis, of Max Bailis & Sons; John T. Hunt, of M. J. Hunt's Sons; John F. Malloy, of Malloy & Schreiner, all of Philadelphia.

Jersey City, N. J.

••• Barney H. Rubine, of Hudson Iron & Metal Co., Bayonne, N. J., has been elected president of the New Jersey chapter of the Institute of Scrap Iron & Steel, Inc., at a meeting held Oct. 13 at Newark, N. J.

Abraham Isaac, of Abraham Isaac & Sons, Elizabeth, N. J., has been re-elected honorary president.

Murray I. Cohen, of Harry Harris & Co., Kearny, N. J., first vice-president; William Isaac, of Abraham Isaac & Sons, Elizabeth, second vice-president; Samuel R. Kaplus, of J. Kaplus & Son, Inc., Newark, third vice-president; Murray Kunin, of Schiavone-Bonomo Corp., Jersey City, re-elected secretary; Ellie Bussell, of Plainfield Iron & Metal Co., Plainfield, N. J., re-elected treasurer.

Cleveland

••• Newly elected officers for the coming year of the Northern Ohio chapter of the Institute of Scrap Iron & Steel, Inc., were announced.

They are: President, David Holub, D. C. Holub & Co., Akron, Ohio; first vice-president, Abner Cohen, M. Cohen & Son Co., Cleveland; second vice-president,

New Salvage Guide Issued

••• A comprehensive, practical manual on industrial salvage entitled "Salvage Manual for Industry" has just been issued by the Technical Service Section, Industrial Salvage Branch, WPB. Termed first of its kind, the new manual contains 245 pages of well organized "how-to-do-it" information and classified data authoritatively edited by seven practical salvage engineers and business paper editors. It is described as a combination management manual and technical guide for salvage operations.

Copies may be obtained from the Superintendent of Documents, Government Printing Office, Washington, at 50c. per copy.

SCRAP PRICES

IRON AND STEEL (OTHER THAN RAILROAD) SCRAP

(All Prices Are Per Gross Ton)

ELECTRIC FURNACE, ACID OPEN HEARTH AND FOUNDRY GRADES

	BASIC OPEN HEARTH GRADES		BLAST FURNACE GRADES				Low Phos.		Heavy Structural and Plate			Foundry Steel					
	No. 1 & 2 Hvy. Melt. No. 1 Co. Bk. Shrs. No. 1 & 2 Bundles No. 1 Busheling	Unbaked* Machine Shop Turnings	Mixed Borings and Turnings	Cast Iron Borings	Shovelling Turnings	No. 2 Busheling	Blillet, Bloom, Forge Crops	Bar Crops, Punch- ing Plate Scrap and Cast Steel	3 ft. and Under	2 ft. and Under	1 ft. and Under	2 ft. and Under	1 ft. and Under	Auto. Springs, and Crank- shafts	Alloy Free Low Phos. Turnings	Heavy Axle Forge Turn. Electric First Furnace Cut Bundles	
Pittsburgh, Brackenridge, Butler, Monessen, Midland, Johnstown, Sharon, Canton, Steubenville, Warren, Youngstown, Weirton.....	\$20.00	\$15.00	\$16.00	16.00	\$17.00	\$17.50	\$25.00	\$22.50	\$21.50	\$22.00	\$22.50	\$21.50	\$22.00	\$21.00	\$18.00	\$19.50	\$21.00
Cleveland, Middletown, Cincinnati, Portsmouth.....	19.50	14.50	14.50	15.50	16.50	17.00	24.50	22.00	21.00	21.50	22.00	21.00	21.50	20.50	17.50	19.00	20.50
Chicago, Claymont, Coatesville, Conshohocken, Harrisburg, Phoenixville, Sparrows Point..	18.75	13.75	13.75	14.75	15.75	16.25	23.75	21.25	20.25	20.75	21.25	20.25	20.75	19.75	16.75	18.25	19.75
Ashland, Ky.....	19.50	14.50	14.50	15.50	16.50	17.00	24.50	22.00	21.00	21.50	22.00	21.00	21.50	20.50	17.50	19.00	20.50
Buffalo, N. Y.....	19.25	14.25	14.25	15.25	16.25	16.75	24.25	21.75	20.75	21.25	21.75	20.75	21.25	20.25	17.25	18.75	20.25
Bethlehem, Pa.; Kokomo, Ind..	18.25	13.25	13.25	14.25	15.25	15.75	23.25	20.75	19.75	20.25	20.75	19.75	20.25	19.25	16.25	17.75	19.25
Duluth, Minn.....	18.00	13.00	13.00	14.00	15.00	15.50	23.00	20.50	19.50	20.00	20.50	19.50	20.00	19.00	16.00	17.50	19.00
Detroit, Mich.....	17.85	12.85	12.85	13.85	14.85	15.35	22.85	20.35	19.35	19.85	20.35	19.35	19.85	18.85	15.85	17.35	18.85
Toledo, Ohio.....		12.85	12.85	13.85	14.85	15.35											
St. Louis, Mo.....	17.50	12.50	12.50	13.50	14.50	15.00	22.50	20.00	19.00	19.50	20.00	19.00	19.50	18.50	15.50	17.00	18.50
Atlanta, Ga.; Alabama City, Ala.; Birmingham, Los Angeles; Pittsburgh, Cal.; San Francisco	17.00	12.00	12.00	13.00	14.00	14.50	22.00	19.50	18.50	19.00	19.50	18.50	19.00	18.00	15.00	16.50	18.00
Minneapolis, Colo.....	16.50	11.50	11.50	12.50	13.50	14.00	21.50	19.00	18.00	18.50	19.00	18.00	18.50	17.50	14.50	16.00	17.50
Seattle, Wash.....	14.50	9.50	9.50	10.50	11.50	12.00	19.50	17.00	16.00	16.50	17.00	16.00	16.50	15.00	12.50	14.00	15.50

*Baled turnings are \$5 per gross ton higher.

BUNDLES: Tin can bundles are \$4 below dealers' No. 2 bundles. No. 3 bundles are \$2 less than No. 1 heavy melting.

AT NEW YORK CITY or Brooklyn, the maximum shipping point price is \$15.33 for No. 1 heavy melting, f.o.b. cars, f.a.s. vessel or loaded on truck. Minimum set at \$14 per gross ton at any shipping point in U. S. Other grades carry differentials similar to those in table. New Jersey prices must be computed on basis of all-rail. At Boston the maximum is \$15.05 for No. 1 f.o.b. cars, f.a.s. vessel or loaded on trucks. Shipments from a New England shipping point to a consumer outside New England carry maximum transportation charge of \$6.66 per ton.

SWITCHING CHARGES: Deductions for shipping points within basing points (cents per gross ton) are: Pittsburgh, Brackenridge, 55c.; Midland, Johnstown, Sharon, Youngstown, Warren, Weirton, Cleveland, Toledo, Los Angeles, San Francisco, 42c.; Butler, Monessen, Canton, Steubenville, Cincinnati*, Portsmouth, Ashland, Coatesville, Harrisburg, Phoenixville, Bethlehem, Kokomo, Duluth, St. Louis, 28c.; Buffalo, Claymont, 36c.; Conshohocken, 11c.; Atlanta, Birmingham, 32c.; Pittsburg, Cal., 42c.; Middletown, 14c.; Sparrow's Point, 11c.; Chicago, 84c.; Detroit, 53c.; Alabama City, 26c.; Minneapolis, 22c.; Seattle, 38c. *At Cincinnati, for basic open hearth grades, foundry steel and auto springs and crankshafts, deduct 80c. per ton.

PITTSBURGH basing point includes switching districts of Bessemer, Homestead, Duquesne, Munhall and McKeesport. Cincinnati basing point includes Newport, Ky., switching district. St. Louis includes switching districts of Granite City, East St. Louis, Madison, Ill. San Francisco includes switching districts of S. San Francisco, Niles and Oakland, Cal. Claymont, Del., includes the switching point of Chester, Pa. Chicago includes Gary, Ind., switching district.

MAXIMUM SHIPPING POINT PRICE—Where shipment is by rail or vessel, or by combination of rail and vessel, the scrap is at its shipping point when placed f.o.b. railroad or f.a.s. vessel. In such cases, the maximum shipping point prices shall be: (a) For shipping points located within a basing point, the price listed in the table above

for the scrap at the basing point in which the shipping point is located, minus the lowest established switching charge for scrap within the basing point and (b) for shipping points located outside the basing point, the price in table above at the most favorable basing point minus the lowest transportation charge by rail or water or combination thereof. In lieu of dock charge add 75c. a ton*, but 50c. if moved by deck scow or railroad lighter. Shipping by motor vehicle: The scrap is at its shipping point when loaded. For shipping points located within basing points take price listed in table minus applicable switching charge. If located outside a basing point, the price at the most favorable basing point minus lowest established charge for transporting by common carrier. If no established transportation rate exists, the customary costs are deducted. Published dock charges prevail. If unpublished include 75c.* For exceptions see official order.

UNPREPARED SCRAP: For unprepared scrap, maximum prices shall be \$3.50 (and in the case of the material from which No. 1, No. 2, and No. 3 bundles are made \$4) less maximum prices for the corresponding grade or grades of prepared scrap. In no case, however, shall electric furnace and foundry grades be used as the "corresponding grade or grades of prepared scrap." Converter may charge \$2.50 per ton on consumer-owned unprepared remote scrap (see order). A preparation-in-transit charge for allocated unprepared scrap is provided.

NEW LISTED GRADES: Priced in dollars per gross ton less than No. 1 heavy melting steel. Pit scrap, ladle skulls, slag reclaim, etc., of 85% or more Fe priced—\$2; 75 to 85% Fe—\$4; under 75% Fe—\$8 per ton. Mill scale of 65% or more Fe—\$8 per ton. Mill cinder and grindings, shipping point maximum price of \$4 per gross ton at all U. S. shipping points.

CHEMICAL BORINGS: No. 1 (new, clean, containing not more than 1 per cent oil), \$1 less than No. 1 heavy melting; No. 2 (new, clean, containing not more than 1.5 per cent oil), \$2 less than No. 1 heavy melting. If loaded in box cars add 75c.

*At Memphis 50c.; Great Lakes ports \$1; New England \$1.25.

RAILROAD SCRAP						CAST IRON SCRAP			
No. 1 RR Heavy Melting	Scrap Ratio	Rails for Reroiling	Scrap Rails			No. 1 cupola cast.....	Group A	Group B	Group C
			3 ft. and Under	2 ft. and Under	18 in. and Under				
Cleveland, Cincinnati, Ashland, Portsmouth, Middletown.....	\$20.50	\$21.50	\$23.00	\$23.50	\$23.75	\$24.00	\$18.00	\$19.00	\$20.00
Canton, Pittsburgh, Sharon, Steubenville, Wheeling, Youngstown.....	21.00	22.00	23.50	24.00	24.25	24.50	18.00	19.00	20.00
Chicago, Philadelphia, Sparrows Pt., Wilmington..	19.75	20.75	22.25	22.75	23.00	23.25	15.50	16.50	17.50
Birmingham, Los Angeles, San Francisco.....	18.00	19.00	20.50	21.00	21.25	21.50	17.00	18.00	19.00
Buffalo.....	20.25	21.25	22.75	23.25	23.50	23.75	15.50	16.50	17.50
Detroit.....	18.85	19.85	21.35	21.85	22.10	22.35	17.00	18.00	19.00
Duluth.....	19.00	20.00	21.50	22.00	22.25	22.50	15.50	16.50	17.50
Kokomo, Ind.....	17.00	18.00	19.50	20.00	20.25	20.50	17.00	18.00	19.00
Kokomo, Ind.....	19.25	20.25	21.75	22.25	22.50	22.75	20.00	21.00	22.00
Seattle.....	15.50	16.50	18.00	18.50	18.75	19.00			
St. Louis.....	19.50	19.50	21.00	21.50	21.75	22.00			

Tool Steel Scrap Ceiling Prices Set by MPR 379, May 4, 1943

BASE PRICE SEGREGATED			BASE PRICE UNSEGREGATED SOLIDS		BASE PRICE UNSEGREGATED TURNINGS	
Type	Solids, Lb. Cont. W	Turnings, Lb. Cont. W				
Type 1.....	\$1.80	\$1.60	\$1.50 per lb. contained W if 5% or more.		\$1.30 per lb. contained W if 5% or more.	
Type 2.....	1.60	1.40	\$1.15 per lb. contained W if over 1% and less than 5%.		\$1.00 per lb. contained W if 1% and less than 5%.	
Type 3.....	1.25	1.25				
Type 4.....	0.125	0.105	\$0.80 per lb. contained Mo if 1 1/2% or more.		\$0.70 per lb. contained Mo if 1 1/2% or more.	
Type 5.....	0.135	0.115				

*Per lb. of scrap material.

Comparison of Prices . . .

Advances Over Past Week in **Heavy Type**; Declines in *Italics*.

[Prices Are F.O.B. Major Basing Points]

Flat Rolled Steel: (Cents Per Lb.)	Oct. 19, 1943	Oct. 12, 1943	Sept. 21, 1943	Oct. 20, 1942
Hot rolled sheets.....	2.10	2.10	2.10	2.10
Cold rolled sheets.....	3.05	3.05	3.05	3.05
Galvanized sheets (24 ga.)	3.50	3.50	3.50	3.50
Hot rolled strip.....	2.10	2.10	2.10	2.10
Cold rolled strip.....	2.80	2.80	2.80	2.80
Plates.....	2.10	2.10	2.10	2.10
Plates, wrought iron.....	3.80	3.80	3.80	3.80
Stain's c.r. strip (No. 302)	28.00	28.00	28.00	28.00

Tin and Terne Plate: (Dollars Per Base Box)	Oct. 19, 1943	Oct. 12, 1943	Sept. 21, 1943	Oct. 20, 1942
Tin plate, standard cokes	\$5.00	\$5.00	\$5.00	\$5.00
Tin plate, electrolytic...	4.50	4.50	4.50	4.50
Special coated mfg. ternes	4.30	4.30	4.30	4.30

Bars and Shapes: (Cents Per Lb.)	Oct. 19, 1943	Oct. 12, 1943	Sept. 21, 1943	Oct. 20, 1942
Merchant bars.....	2.15	2.15	2.15	2.15
Cold finished bars.....	2.65	2.65	2.65	2.65
Alloy bars.....	2.70	2.70	2.70	2.70
Structural shapes.....	2.10	2.10	2.10	2.10
Stainless bars (No. 302)...	24.00	24.00	24.00	24.00
Wrought iron bars.....	4.40	4.40	4.40	4.40

Wire and Wire Products: (Cents Per Lb.)	Oct. 19, 1943	Oct. 12, 1943	Sept. 21, 1943	Oct. 20, 1942
Plain wire.....	2.60	2.60	2.60	2.60
Wire nails.....	2.55	2.55	2.55	2.55

Rails: (Dollars Per Gross Ton)	Oct. 19, 1943	Oct. 12, 1943	Sept. 21, 1943	Oct. 20, 1942
Heavy rails.....	\$40.00	\$40.00	\$40.00	\$40.00
Light rails.....	40.00	40.00	40.00	40.00

Semi-Finished Steel: (Dollars Per Gross Ton)	Oct. 19, 1943	Oct. 12, 1943	Sept. 21, 1943	Oct. 20, 1942
Rerolling billets.....	\$34.00	\$34.00	\$34.00	\$34.00
Sheet bars.....	34.00	34.00	34.00	34.00
Slabs.....	34.00	34.00	34.00	34.00
Forging billets.....	40.00	40.00	40.00	40.00
Alloy blooms, billets, slabs	54.00	54.00	54.00	54.00

Wire Rods and Skelp: (Cents Per Lb.)	Oct. 19, 1943	Oct. 12, 1943	Sept. 21, 1943	Oct. 20, 1942
Wire rods.....	2.00	2.00	2.00	2.00
Skelp (grvd).....	1.90	1.90	1.90	1.90

The various basing points for finished and semi-finished steel are listed in the detailed price tables, pages 147-158.

Pig Iron: (Per Gross Ton)	Oct. 19, 1943	Oct. 12, 1943	Sept. 21, 1943	Oct. 20, 1942
No. 2 fdy., Philadelphia...	\$25.84	\$25.84	\$25.89	\$25.89
No. 2, Valley furnace...	24.00	24.00	24.00	24.00
No. 2, Southern Cin'ti...	24.68	24.68	24.68	24.68
No. 2, Birmingham.....	20.38	20.38	20.38	20.38
No. 2, foundry, Chicago†	24.00	24.00	24.00	24.00
Basic, del'd eastern Pa...	25.39	25.39	25.39	25.39
Basic, Valley furnace...	23.50	23.50	23.50	23.50
Malleable, Chicago†....	24.00	24.00	24.00	24.00
Malleable, Valley.....	24.00	24.00	24.00	24.00
L. S. charcoal, Chicago..	31.34	31.34	31.34	31.34
Ferromanganese†.....	135.00	135.00	135.00	135.00

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton.
‡For carlots at seaboard.

Scrap: (Per Gross Ton)	Oct. 19, 1943	Oct. 12, 1943	Sept. 21, 1943	Oct. 20, 1942
Heavy melt'g steel, P'gh.	\$20.00	\$20.00	\$20.00	\$20.00
Heavy melt'g steel, Phila.	18.75	18.75	18.75	18.75
Heavy melt'g steel, Ch'go	18.75	18.75	18.75	18.75
No. 1 hy. comp. sheet, Det.	17.85	17.85	17.85	17.85
Low phos. plate, Youngs'n	22.50	22.50	22.50	22.50
No. 1 cast, Pittsburgh...	20.00	20.00	20.00	20.00
No. 1 cast, Philadelphia.	20.00	20.00	20.00	20.00
No. 1 cast, Ch'go.....	20.00	20.00	20.00	20.00

Coke, Connellsville: (Per Net Ton at Oven)	Oct. 19, 1943	Oct. 12, 1943	Sept. 21, 1943	Oct. 20, 1942
Furnace coke, prompt...	\$6.50	\$6.50	\$6.50	\$6.00
Foundry coke, prompt...	7.50	7.375	6.875	6.875

Non-Ferrous Metals: (Cents per Lb. to Large Buyers)	Oct. 19, 1943	Oct. 12, 1943	Sept. 21, 1943	Oct. 20, 1942
Copper, electro., Conn...	12.00	12.00	12.00	12.00
Copper, Lake, New York.	12.00	12.00	12.00	12.00
Tin (Straits), New York.	52.00	52.00	52.00	52.00
Zinc, East St. Louis....	8.25	8.25	8.25	8.25
Lead, St. Louis.....	6.35	6.35	6.35	6.35
Aluminum, Virgin, del'd.	15.00	15.00	15.00	15.00
Nickel, electrolytic.....	35.00	35.00	35.00	35.00
Magnesium, ingot.....	20.50	20.50	20.50	22.50
Antimony (Asiatic), N. Y.	16.50	16.50	16.50	16.50

Composite Prices . . .

FINISHED STEEL	
Oct. 19, 1943.....	2.25513c. a Lb.....
One week ago.....	2.25513c. a Lb.....
One month ago.....	2.25513c. a Lb.....
One year ago.....	2.26190c. a Lb.....

	HIGH	LOW
1943.....	2.25513c.,	2.25513c.,
1942.....	2.26190c.,	2.26190c.,
1941.....	2.43078c.,	2.43078c.,
1940.....	2.30467c., Jan. 2	2.24107c., Apr. 16
1939.....	2.35367c., Jan. 3	2.26689c., May 16
1938.....	2.58414c., Jan. 4	2.27207c., Oct. 18
1937.....	2.58414c., Mar. 9	2.32263c., Jan. 4
1936.....	2.32263c., Dec. 28	2.05200c., Mar. 10
1935.....	2.07642c., Oct. 1	2.06492c., Jan. 8
1934.....	2.15367c., Apr. 24	1.95757c., Jan. 2
1933.....	1.95578c., Oct. 3	1.75836c., May 2
1932.....	1.89196c., July 5	1.83901c., Mar. 1
1931.....	1.99626c., Jan. 13	1.86586c., Dec. 29
1930.....	2.25488c., Jan. 7	1.97319c., Dec. 9
1929.....	2.31773c., May 28	2.26498c., Oct. 29

Weighted index based on steel bars, beams, tank plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing 78 per cent of the United States output. Index recapitulated in Aug. 28, 1941, issue.

PIG IRON	
.....23.61 a Gross Ton.....	
.....23.61 a Gross Ton.....	
.....23.61 a Gross Ton.....	
.....23.61 a Gross Ton.....	

	HIGH	LOW
.....	\$23.61	\$23.61
.....	23.61	23.61
\$23.61, Mar. 20	\$23.45, Jan. 2	
23.45, Dec. 23	22.61, Jan. 2	
22.61, Sept. 19	20.61, Sept. 12	
23.25, June 21	19.61, July 6	
23.25, Mar. 9	20.25, Feb. 16	
19.74, Nov. 24	18.73, Aug. 11	
18.84, Nov. 5	17.83, May 14	
17.90, May 1	16.90, Jan. 27	
16.90, Dec. 5	13.56, Jan. 3	
14.81, Jan. 5	13.56, Dec. 6	
15.90, Jan. 6	14.79, Dec. 15	
18.21, Jan. 7	15.90, Dec. 16	
18.71, May 14	18.21, Dec. 17	

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

SCRAP STEEL	
.....\$19.17 a Gross Ton.....	
.....\$19.17 a Gross Ton.....	
.....\$19.17 a Gross Ton.....	
.....\$19.17 a Gross Ton.....	

	HIGH	LOW
.....	\$19.17	\$19.17
.....	19.17	19.17
\$22.00, Jan. 7	\$19.17, Apr. 10	
21.83, Dec. 30	16.04, Apr. 16	
22.50, Oct. 3	14.08, May 16	
15.00, Nov. 22	11.00, June 7	
21.92, Mar. 30	12.67, June 9	
17.75, Dec. 21	12.67, June 9	
13.42, Dec. 10	10.33, Apr. 29	
13.00, Mar. 13	9.50, Sept. 23	
12.25, Aug. 8	6.75, Jan. 3	
8.50, Jan. 12	6.43, July 8	
11.33, Jan. 6	8.50, Dec. 29	
15.00, Feb. 18	11.25, Dec. 9	
17.58, Jan. 29	14.08, Dec. 9	

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

Prices of Finished Iron and Steel

Steel prices shown here are f.o.b. basing points, in cents per lb., unless otherwise indicated. On some products either quantity deductions or quantity extras apply. In many cases gage, width, mutting, physical, chemical extras, etc., apply to the base price. Actual realized prices to the mill, therefore, are affected by extras, reductions, and in most cases freight absorbed to meet competition. Delivered prices do not reflect new 3 per cent tax on freight rates.

Basing Point ↓ Product	DELIVERED TO														
	Pitts- burgh	Chicago	Gary	Cleve- land	Birm- ingham	Buffalo	Youngs- town	Spar- rows Point	Granite City	Middle- town, Ohio	Gulf Ports, Cars	Pacific Ports, Cars	Detroit	New York	Phila- delphia
SHEETS															
Hot rolled	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.20¢	2.10¢		2.65¢	2.20¢	2.34¢	2.27¢
Cold rolled ¹	3.05¢	3.05¢	3.05¢	3.05¢		3.05¢	3.05¢		3.15¢	3.05¢		3.70¢	3.15¢	3.39¢	3.37¢
Galvanized (24 ga.)	3.50¢	3.50¢	3.50¢		3.50¢	3.50¢	3.50¢	3.50¢	3.60¢	3.50¢		4.05¢		3.74¢	3.67¢
Enameling (20 ga.)	3.35¢	3.35¢	3.35¢	3.35¢			3.35¢		3.45¢	3.35¢		4.00¢	3.45¢	3.71¢	3.67¢
Long ternes ²	3.80¢		3.80¢									4.55¢		4.16¢	4.12¢
STRIP															
Hot rolled ³	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢			2.10¢		2.75¢	2.20¢	2.46¢	
Cold rolled ⁴	2.80¢	2.90¢		2.80¢			2.80¢		(Worcester=3.00¢)				2.90¢	3.16¢	
Cooperage stock	2.20¢	2.20¢			2.20¢		2.20¢							2.56¢	
Commodity C-R	2.95¢	3.05¢		2.95¢			2.95¢		(Worcester=3.35¢)				3.05¢	3.31¢	
TIN MILL PRODUCTS															
Coke tin plate, base box	\$5.00	\$5.00	\$5.00						\$5.10					5.36¢	5.32¢
.50 } Electro tin plate, box	\$4.50	\$4.50	\$4.50												
.75 }	\$4.65	\$4.65	\$4.65												
Black plate, 29 gage ⁵	3.05¢	3.05¢	3.05¢						3.15¢			4.05¢ ¹²			3.37¢
Mfg. ternes, special box	\$4.30	\$4.30	\$4.30						\$4.40						
BAR															
Carbon steel	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			(Duluth=2.25¢)		2.50¢	2.80¢	2.25¢	2.49¢	2.47¢
Rail steel ⁶	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢					2.50¢	2.80¢			
Reinforcing (billet) ⁷	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			2.50¢	2.55¢ ¹³	2.25¢	2.39¢	
Reinforcing (rail) ⁷	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢				2.50¢	2.55¢ ¹³	2.25¢		2.47¢
Cold finished ⁸	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢			(Detroit=2.70¢)					2.99¢	2.97¢
Alloy, hot rolled	2.70¢	2.70¢				2.70¢			(Bethlehem, Massillon, Canton=2.70¢)				2.80¢		
Alloy, cold drawn	3.35¢	3.35¢	3.35¢	3.35¢		3.35¢							3.45¢		
									(Coatesville and Claymont=2.10¢)						
PLATES															
Carbon steel	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢	2.35¢		2.45¢	2.65¢	2.31¢	2.29¢	2.15¢
Floor plates	3.35¢	3.35¢									3.70¢	4.00¢		3.71¢	3.67¢
Alloy	3.50¢	3.50¢							(Coatesville=3.50¢)		3.95¢	4.15¢		3.70¢	3.59¢
SHAPES															
Structural	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢			(Bethlehem=2.10¢)		2.45¢	2.75¢		2.27¢	2.215¢
SPRING STEEL, C-R															
0.26 to 0.50 Carbon	2.80¢			2.80¢					(Worcester=3.00¢)						
0.51 to 0.75 Carbon	4.30¢			4.30¢					(Worcester=4.50¢)						
0.76 to 1.00 Carbon	6.15¢			6.15¢					(Worcester=6.35¢)						
1.01 to 1.25 Carbon	8.35¢			8.35¢					(Worcester=8.55¢)						
WIRE															
Bright ¹⁴	2.60¢	2.60¢		2.60¢	2.60¢				(Worcester=2.70¢)			3.10¢			2.92¢
Galvanized															
add proper size extra and galvanized extra to bright wire base, above.															
Spring (High Carbon)	3.20¢	3.20¢		3.20¢					(Worcester=3.30¢)			3.70¢			3.52¢
PILING															
Steel sheet	2.40¢	2.40¢				2.40¢						2.95¢			2.72¢

¹ Mill run sheets are 10c per 100 lb. less than base; and primes only, 25c. above base. ² Unassorted 8-lb. coating. ³ Widths up to 12 in. ⁴ Carbon 0.25 per cent and less. ⁵ Applies to certain width and length limitations. ⁶ For merchant trade. ⁷ Prices for straight length material only, from a producer to a consumer. Functional discount of 25c. per 100 lb. to fabricators. ⁸ Also shafting. For quantities of 20,000 to 29,999 lb. ⁹ Carload lot to manufacturing trade. ¹⁰ These prices do not apply if the customary means of transportation (rail and water) are not used. ¹¹ Boxed. ¹² Portland and Seattle price, San Francisco price is 2.50c. ¹³ This bright wire base price to be used in figuring annealed and bright finish wires, commercial spring wire and galvanized wire.

GOVERNMENT CEILING—Price Schedule No. 6 issued April 16, 1941, governs steel mill prices; Price Schedule No. 49 governs warehouse prices which are on another page of this issue.

EXCEPTIONS TO PRICE SCHEDULE No. 6—On hot rolled carbon bars, Phoenix Iron Co. may quote 2.35c. at established basing points. Calumet Steel division of Borg Warner may quote 2.35c., Chicago, on bars from its 8-in. mill; Joslyn Mfg. Co. may quote 2.35c., Chicago base. On rail steel bars Sweets Steel Co. may quote 2.35c., f.o.b. mill. On hot rolled sheets, Andrews Steel Co. may quote for shipment to Detroit area on Middletown base; Parkersburg Iron & Steel may quote \$2.25 per hundred f.o.b. Parkersburg, W. Va. On galvanized sheets, Andrews Steel may quote 3.75c., at established basing points; Parkersburg Iron & Steel may quote \$3.85 per hundred f.o.b. Parkersburg, W. Va. On hot rolled strip, Joslyn Mfg. Co. may quote 2.30c., Chicago base. On plates, Granite City Steel Co. may quote 2.35c., f.o.b. mill, and Central Iron & Steel Co. may quote 2.20c., f.o.b. basing points. On shapes, Phoenix Iron Co. may quote 2.30c. established basing points and 2.50c. Phoenixville for export.

On rail steel merchant bars, Eckels-Nye Corp. may charge 2.40c. On tubing, South Chester Tube Co. may price Gulf or Pacific Coast all-rail shipments and shipments west of Harrisburg on basis of f.o.b. Chester. On lend-lease sales to eastern seaboard, Sheffield Steel Co. and Colorado Fuel & Iron Corp. may sell f.o.b. mill. SEMIFINISHED STEEL—Follansbee Steel Corp. may sell forging billets at \$40.50 f.o.b. Toronto; Continental Steel Corp. may sell Acme Steel Co. at \$34 for rerolling billets plus extras and freight; Ford Motor Co. may sell rerolling billets at \$34 f.o.b. Dearborn; Andrews Steel Co. may sell forging billets at \$50 at established basing points and slabs at \$41; Empire Sheet and Tin Plate may sell slabs at \$41 at established basing points and sheet bars at \$39 f.o.b. mill; on lend-lease sales Northwestern Steel & Wire Co. may charge \$41 per gross ton f.o.b. mill for rerolling billets; on lend-lease sales Wheeling Steel Corp. may charge \$36 per ton for small billets, f.o.b. Portsmouth and \$37 per ton for sheet bars f.o.b. Portsmouth; Laclede Steel Co. on semi-finished sales for lend-lease shipped to eastern seaboard may use Chicago basing point prices f.o.b. Alton and Madison, Ill. ALLOY STEEL BARS—Texas Steel Co. may use Chicago base f.o.b. Fort Worth.

PRICES

WAREHOUSE PRICES

(Delivered Metropolitan areas, per 100 lb. These prices do not necessarily apply for dislocated tonnage shipments when the f.o.b. City prices are used in conformance with OPA Schedule 49)

Cities	SHEETS			STRIP		Plates 1/4 in. and heavier	Structural Shapes	BARS		ALLOY BARS			
	Hot Rolled (10 gage)	Cold Rolled	Galvanized (24 gage)	Hot Rolled	Cold Rolled			Hot Rolled	Cold Finished	† Hot Rolled, 2300	† Hot Rolled, 3100	† Cold Drawn, 2300	† Cold Drawn, 3100
*Philadelphia	\$3.518	\$4.872 ⁵	\$5.018	\$3.922	\$4.772	\$3.605	\$3.666	\$3.822	\$4.072		\$7.116		
*New York	3.590	4.613 ²	5.010	3.974 ⁶	4.774	3.768	3.758	3.853	4.103	6.008	7.158	7.303	8.483
*Boston	3.774	4.744	5.224	4.106	4.715	3.912	3.912	4.044	4.144	6.162	7.312	7.344	8.494
*Baltimore	3.394	4.852	4.894	3.902	4.752	3.594	3.759	3.802	4.052				
*Norfolk	3.771	4.965	5.371	4.165	4.865	3.971	4.002	4.065	4.165				
*Washington	3.596	4.841	5.196	4.041	4.741	3.796	3.930	3.941	4.041				
*Chicago	3.25	4.20	5.23 ⁴	3.60	4.65 ⁸	3.55	3.55	3.50	3.75	5.75	6.80	6.85	8.00
*Milwaukee	3.387	4.337 ²	5.272 ⁴	3.737	4.787 ⁸	3.687	3.687	3.637	3.887	5.987	7.137	7.087	8.237
*Cleveland	3.35	4.40	4.877 ⁴	3.60	4.45	3.40	3.588	3.35	3.75	5.958	7.108	6.85	8.00
*Buffalo	3.35	4.40	4.75 ⁴	3.60	4.45	3.40	3.588	3.35	3.75	5.958	7.108	6.85	8.00
*Detroit	3.45	4.50	5.00 ⁴	3.70	5.00 ⁸	3.609	3.681	3.45	3.80	6.08	7.23	7.159	8.309
*Cincinnati	3.425	4.475 ²	4.825 ¹	3.675	4.711	3.611	3.691	3.611	4.011				
*St. Louis	3.397	4.247 ²	5.172 ⁴	3.747	4.931 ⁸	3.697	3.697	3.647	4.031	6.131	7.281	7.231	8.381
*Pittsburgh	3.35	4.40	4.75	3.60	4.45	3.40	3.40	3.35	3.75	5.75	7.15	6.85	8.25
*St. Paul	3.51	4.48	5.257 ⁴	3.86	4.35 ²	3.81 ¹	3.81 ¹	3.76 ⁹	4.361	6.09	7.24	7.561	8.711
*Omaha	3.865	5.443	5.608 ⁴	4.215		4.185	4.185	4.115	4.443				
*Indianapolis	3.58	3.58	4.568	4.918	3.768	4.78	3.63	3.58	3.98	6.08	7.23	7.18	8.33
*Birmingham	3.45 ³		4.75 ¹	3.70 ³		3.55 ³	3.55 ³	3.50 ³	4.43				
*Memphis	3.85	4.66	5.25	4.10		3.95	3.95	3.90	4.31				
*New Orleans	3.95	4.85	5.25	4.20		3.90	3.90	4.10	4.60				
*Houston	3.75	5.43	5.25	4.30		5.25	5.25	3.75	4.50				
*Los Angeles	4.95	7.15	6.95	4.90		4.90	4.60	4.35	5.70	8.55	8.55	10.55	9.55
*San Francisco	4.55	7.55	6.60	4.50		4.85	4.35	3.95	5.55	9.90	8.80	10.80	9.80
*Seattle	4.65 ⁷	6.63	5.70 ⁷	4.25		4.75	4.45	4.20	5.75		8.00		

NATIONAL EMERGENCY (N. E.) STEELS

(Hot Rolled Mill Extras for Alloy Content)

Designa- tion	CHEMICAL COMPOSITION LIMITS, PER CENT							Basic Open-Hearth		Electric Furnace			
	Carbon	Man- ganese	Phos- phorus Max.	Sul- phur Max.	Silicon	Chro- mium	Nickel	Molyb- denum	Bars and Strip	Billets, Blooms and Slabs	Bars and Strip	Billets, Blooms and Slabs	
NE 1330	.28/.33	1.60/1.90	.040	.040	.20/.35				.10c	\$2.00			
NE 1335	.33/.38	1.60/1.90	.040	.040	.20/.35				.10	2.00			
NE 1340	.38/.43	1.60/1.90	.040	.040	.20/.35				.10	2.00			
NE 1345	.43/.48	1.60/1.90	.040	.040	.20/.35				.10	2.00			
NE 1350	.48/.53	1.60/1.90	.040	.040	.20/.35				.10	2.00			
NE 8613	.12/.17	.70/.90	.040	.040	.20/.35	.40/.60	.40/.70	.15/.25	.75	15.00	1.25	25.00	
NE 8615	.13/.18	.70/.90	.040	.040	.20/.35	.40/.60	.40/.70	.15/.25	.75	15.00	1.25	25.00	
NE 8617	.15/.20	.70/.90	.040	.040	.20/.35	.40/.60	.40/.70	.15/.25	.75	15.00	1.25	25.00	
NE 8620	.18/.23	.70/.90	.040	.040	.20/.35	.40/.60	.40/.70	.15/.25	.75	15.00	1.25	25.00	
NE 8630	.28/.33	.70/.90	.040	.040	.20/.35	.40/.60	.40/.70	.15/.25	.75	15.00	1.25	25.00	
NE 8635	.33/.38	.75/1.00	.040	.040	.20/.35	.40/.60	.40/.70	.15/.25	.75	15.00	1.25	25.00	
NE 8637	.35/.40	.75/1.00	.040	.040	.20/.35	.40/.60	.40/.70	.15/.25	.75	15.00	1.25	25.00	
NE 8640	.38/.43	.75/1.00	.040	.040	.20/.35	.40/.60	.40/.70	.15/.25	.75	15.00	1.25	25.00	
NE 8642	.40/.45	.75/1.00	.040	.040	.20/.35	.40/.60	.40/.70	.15/.25	.75	15.00	1.25	25.00	
NE 8645	.43/.48	.75/1.00	.040	.040	.20/.35	.40/.60	.40/.70	.15/.25	.75	15.00	1.25	25.00	
NE 8650	.48/.53	.75/1.00	.040	.040	.20/.35	.40/.60	.40/.70	.15/.25	.75	15.00	1.25	25.00	
NE 8720	.18/.23	.70/.90	.040	.040	.20/.35	.40/.60	.40/.70	.20/.30	.80	16.00	1.30	26.00	
NE 9255	.50/.60	.70/.95	.040	.040	1.80/2.20				.40	8.00			
NE 9260	.55/.65	.70/1.00	.040	.040	1.80/2.20				.40	8.00			
NE 9261	.55/.65	.70/1.00	.040	.040	1.80/2.20	.10/.25			.65	13.00			
NE 9262	.55/.65	.70/1.00	.040	.040	1.80/2.20	.25/.40			.65	13.00			
NE 9415	.13/.18	.80/1.10	.040	.040	.20/.35	.30/.50	.30/.60	.08/.15	.75	15.00	1.25	\$25.00	
NE 9420	.18/.23	.80/1.10	.040	.040	.20/.35	.30/.50	.30/.60	.08/.15	.75	15.00	1.25	25.00	
NE 9422	.20/.25	.80/1.10	.040	.040	.20/.35	.30/.50	.30/.60	.08/.15	.75	15.00	1.25	25.00	
NE 9425	.23/.28	.80/1.10	.040	.040	.20/.35	.30/.50	.30/.60	.08/.15	.75	15.00	1.25	25.00	
NE 9430	.28/.33	.90/1.20	.040	.040	.20/.35	.30/.50	.30/.60	.08/.15	.75	15.00	1.25	25.00	
NE 9435	.33/.38	.90/1.20	.040	.040	.20/.35	.30/.50	.30/.60	.08/.15	.75	15.00	1.25	25.00	
NE 9437	.35/.40	.90/1.20	.040	.040	.20/.35	.30/.50	.30/.60	.08/.15	.75	15.00	1.25	25.00	
NE 9440	.38/.43	.90/1.20	.040	.040	.20/.35	.30/.50	.30/.60	.08/.15	.75	15.00	1.25	25.00	
NE 9442	.40/.45	1.00/1.30	.040	.040	.20/.35	.30/.50	.30/.60	.08/.15	.80	16.00	1.30	26.00	
NE 9445	.43/.48	1.00/1.30	.040	.040	.20/.35	.30/.50	.30/.60	.08/.15	.80	16.00	1.30	26.00	
NE 9450	.48/.53	1.20/1.50	.040	.040	.20/.35	.30/.50	.30/.60	.08/.15	.80	16.00	1.30	26.00	
NE 9537*	.35/.40	1.20/1.50	.040	.040	.40/.60	.40/.60	.40/.70	.15/.25	1.20	24.00	1.70	34.00	
NE 9540*	.38/.43	1.20/1.50	.040	.040	.40/.60	.40/.60	.40/.70	.15/.25	1.20	24.00	1.70	34.00	
NE 9542*	.40/.45	1.20/1.50	.040	.040	.40/.60	.40/.60	.40/.70	.15/.25	1.20	24.00	1.70	34.00	
NE 9545*	.43/.48	1.20/1.50	.040	.040	.40/.60	.40/.60	.40/.70	.15/.25	1.20	24.00	1.70	34.00	
NE 9550*	.48/.53	1.20/1.50	.040	.040	.40/.60	.40/.60	.40/.70	.15/.25	1.20	24.00	1.70	34.00	

BASE QUANTITIES: Hot rolled sheets, cold rolled sheets, hot rolled strip, plates, shapes and hot rolled bars, 400 to 1999 lb.; galvanized sheets, 150 to 1499 lb.; cold rolled strip, extra apply on all quantities; cold finished bars, 1500 lb. and over; SAE bars, 1000 lb. and over; Ex- ceptions: ¹ 500 to 1499 lb. ² 400 to 1499 lb. ³ 400 to 3999 lb. ⁴ 450 to 1499 lb. ⁵ 1000 to 1999 lb. ⁶ 0 to 1999 lb. ⁷ 300 to 10,000 lb. ⁸ 2000 to 39,999 lb. ⁹ 400 to 14,999 lb. At Philadelphia galvanized sheets, 2500 more bundles; Boston, cold rolled and galvanized sheets, 450 to 3749 lb.; San Francisco, hot rolled sheets, 400 to 39,999 lb.; galvanized and cold rolled sheets, 750 to 4999 lb.; cold fin. bars, 0-299 lb.; hot rolled alloy bars, 0-4999 lb.; Seattle, cold finished bars, 1000 lb. and over, hot rolled alloy bars, 0-1999 lb.; Memphis, hot rolled sheets, 400 to 1999 lb.; galvanized sheets, 150 and over; Los Angeles, hot rolled sheets, bars, plates, cold rolled sheets, 300 to 1999 lb.; galvanized sheets, 1 to 6 bundles; cold finished bars, 1 to 99 lb.; SAE bars, 100 lb. Extras for size, quality, etc., apply on above quotations.

† Los Angeles, San Francisco and Seattle prices reflect special provisions of amendment No. 2 to OPA Price Schedule No. 49.

†† For zoned cities these grades have been revised to NE 8617-20.

‡ For zoned cities these grades have been revised to NE 9442-45 Ann'd.

* Base delivered prices according to price zones established by Amendments to RPS 49 including the 3% transportation tax—not in- cluding the 6% freight increase of March 18, 1942, rescinded May 15, 1943.

*Recommended for large sections only. Note: The extras shown above are in addition to a base price of 2.70c. per 100 lb., on finished products and \$54 per gross ton on semi-finished steel major basing points and are in cents per 100 lb. and dollars per gross ton in semi-finished. When acid open-hearth is spec- ified and acceptable add to basic open hearth alloy differential 0.25c. per lb. for bars and bar strip, \$5.00 per gross ton for billets, blooms and slabs. The ranges shown above are restricted to sizes 100 sq. in. or less or equiv- alent cross sectional area 18 in. wide or under with a max. individual piece weight of 7000 lb.

PRICES

SEMI-FINISHED STEEL

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (rerolling only). Prices delivered Detroit are \$2.00 higher; f.o.b. Duluth, billets only, \$2.00 higher; billets f.o.b. Pacific ports are \$12 higher. Delivered prices do not reflect new three per cent tax on freight rates.

	Per Gross Ton
Rerolling	\$34.00
Forging quality	40.00
Alloy steel: Pittsburgh, Chicago, Canton, Massillon, Buffalo, or Bethlehem, per gross ton	\$54.00

Shell Steel

	Per Gross Ton
3 in. to 12 in.	\$52.00
12 in. to 18 in.	54.00
18 in. and over	56.00
Basic open hearth shell steel, f.o.b. Pittsburgh, Chicago, Buffalo, Gary, Cleveland, Youngstown and Birmingham. Prices delivered Detroit are \$2.00 higher.	

Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting, or quantity.

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

	Per Gross Ton
Open hearth or bessemer	\$34.00

Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved, universal and sheared ...	1.90c.

Wire Rods

(No. 5 to 9/32 in.)

	Per Lb.
Pittsburgh, Chicago, Cleveland ...	2.00c.
Worcester, Mass.	2.10c.
Birmingham	2.00c.
San Francisco	2.50c.
Galveston	2.35c.

9/32 in. to 47/64 in., 0.15c. a lb. higher. Quantity extras apply.

TOOL STEEL

(F.o.b. Pittsburgh, Bethlehem, Syracuse)

	Base per lb.
High speed	67c.
Straight molybdenum	54c.
Tungsten-molybdenum	57 1/2c.
High-carbon-chromium	43c.
Oil hardening	24c.
Special carbon	22c.
Extra carbon	18c.
Regular carbon	14c.

Warehouse prices east of Mississippi are 2c. a lb. higher; west of Mississippi 3c. higher.

CORROSION AND HEAT-RESISTING STEEL

(Per lb. base price, f.o.b. Pittsburgh)

Chromium-Nickel Alloys

	No. 304	No. 302
Forging billets	21.25c.	20.40c.
Bars	25.00c.	24.00c.
Plates	29.00c.	27.00c.
Structural shapes	25.00c.	24.00c.
Sheets	36.00c.	34.00c.
Hot rolled strip	23.50c.	21.50c.
Cold rolled strip	30.00c.	28.00c.
Drawn wire	25.00c.	24.00c.

Straight-Chromium Alloys

	No. 410	No. 430	No. 442	No. 446
F.Billets 15.725c. 16.15c. 19.125c. 23.375c.				
Bars ... 18.50c. 19.00c. 22.50c. 27.50c.				
Plates ... 21.50c. 22.00c. 25.50c. 30.50c.				
Sheets ... 26.50c. 29.00c. 32.50c. 36.50c.				
Hot strip 17.00c. 17.50c. 24.00c. 35.00c.				
Cold strip 22.00c. 22.50c. 32.00c. 52.00c.				

Chromium-Nickel Clad Steel (20%)

	No. 304
Plates	18.00c.*
Sheets	19.00c.

*Includes annealing and pickling.

More

THAN A POUND



In the Metal Finishing field, the name UDYLITE stands for better, more successful Cadmium Plating. . . . Since 1919 Udyllite's famous research laboratories and staff of metal finishing engineers have pioneered the use of Cadmium—Developing new and better methods of application—Disseminating this information and improvements to the trade.

. . . The benefit of Udyllite's years of experience is your for the asking. When you buy Cadmium Anodes, plating equipment or supplies from Udyllite you receive "More than a pound". The "know-how" behind each Udyllite product is a plus value you cannot find elsewhere. . . . If you are not already a Udyllite customer we invite you to enjoy the advantages of Udyllite's complete metal finishing service.

THE UDYLITE CORPORATION

1651 E. GRAND BLVD. • DETROIT, MICHIGAN

Chicago 12
1943 Walnut Street

Long Island City 1, N. Y.
11-16 44th Drive

Cleveland 3
4408 Carnegie Ave.

FORGINGS that GAIN TIME

Confronting all of us today is the supreme task of making time, because it is such a vital element in the strategy of modern warfare. T & W makes forgings that gain time—time that results in more war production at a faster rate. Plus or minus a few minutes of time at any stage in forming a forging may gain hours in the length of time it takes to get the forging onto your assembly line. T & W Forgings usually require less machining and finishing and that's where they gain time for you. Ask a T & W Forging Engineer about forgings that gain time.



TRANSUE & WILLIAMS
STEEL FORGING CORPORATION • ALLIANCE, O.

SALES OFFICES: NEW YORK, PHILADELPHIA, CHICAGO, INDIANAPOLIS, DETROIT AND CLEVELAND

PRICES

BOLTS, NUTS, RIVETS, SET-SCREWS Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Machine and Carriage Bolts:

	Per Cent Off List
1/2 in. & smaller x 6 in. & shorter.....	65 1/2
9/16 & 5/8 in. x 6 in. & shorter.....	63 1/2
3/4 to 1 in. x 6 in. & shorter.....	61
1 1/4 in. and larger, all length.....	59
All diameters over 6 in. long.....	59
Lag, all sizes.....	62
Plow bolts.....	65

Nuts, Cold Punched or Hot Pressed: (Hexagon or Square)

1/2 in. and smaller.....	62
9/16 to 1 in. inclusive.....	59
1 1/8 to 1 1/2 in. inclusive.....	57
1 5/8 in. and larger.....	56

On above bolts and nuts, excepting plow bolts, additional allowance of 10 per cent for full container quantities. There is an additional 5 per cent allowance for carload shipments.

Semi-Fin. Hexagon Nuts U.S.S. S.A.E.

7/16 in. and smaller.....	64
1/2 in. and smaller.....	62
1/2 in. through 1 in.....	60
9/16 to 1 in.....	59
1 1/8 in. through 1 1/2 in.....	57
1 5/8 in. and larger.....	56

In full container lots, 10 per cent additional discount.

Stove Bolts

Packages, nuts loose.....	71 and 10
In packages, with nuts attached.....	71
In bulk.....	80

On stove bolts freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago, New York on lots of 200 lb. or over.

Large Rivets (1/2 in. and larger)

Base per 100 lb.	
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham.....	\$3.75

Small Rivets (7/16 in. and smaller)

Per Cent Off List	
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham.....	65 and 5

Cap and Set Screws

	Per Cent Off List
Upset full fin. hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in.....	64
Upset set screws, cup and oval points.....	71
Milled studs.....	46
Flat head cap screws, listed sizes.....	36
Fillister head cap, listed sizes.....	51

Freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.

RAILS, TRACK SUPPLIES

(F.o.b. Mill)

Standard rails, heavier than 60 lb.	
No. 1 O.H., gross ton.....	\$40.00
Angle bars, 100 lb.....	2.70
(F.o.b. Basing Points) Per Gross Ton	
Light rails (from billets).....	\$40.00
Light rails (from rail steel).....	39.00
Base per lb.	
Cut spikes.....	3.00c.
Screw spikes.....	5.15c.
Tie plates, steel.....	2.15c.
Tie plates, Pacific Coast.....	2.30c.
Track bolts.....	4.75c.
Track bolts, heat treated, to railroads.....	5.00c.
Track bolts, jobbers discount.....	63-5

Basing points, light rails—Pittsburgh, Chicago, Birmingham; spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo; spikes alone—Youngstown, Lebanon, Pa., Richmond.

ROOFING TERNE PLATE

(F.o.b. Pittsburgh, 112 Sheets)

	20x14 in.	20x28 in.
8-lb. coating I.C.	\$6.00	\$12.00
15-lb. coating I.C.	7.00	14.00
20-lb. coating I.C.	7.50	15.00

PRICES

ELECTRICAL SHEETS

(Base, f.o.b. Pittsburgh)

	Per Lb.
Field grade	3.20c.
Armature	3.55c.
Electrical	4.05c.
Motor	4.95c.
Dynamo	5.65c.
Transformer 72	6.15c.
Transformer 65	7.15c.
Transformer 58	7.65c.
Transformer 52	8.15c.

F.o.b. Granite City, add 10c. per 100 lb. on field grade to and including dynamo. Pacific ports add 75c. per 100 lb. on all grades.

WIRE PRODUCTS

To the trade, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham

	Base per Keg
Standard wire nails	\$2.55
Coated nails	2.55
Cutnails, carloads	3.85
	Base per 100 Lb.
Annealed fence wire	\$3.05
Annealed galvanized fence wire	3.40
	Base Column
Woven wire fence*	67
Fence posts (carloads)	69
Single loop bale ties	59
Galvanized barbed wire†	70
Twisted barbless wire	70

*15½ gage and heavier. †On 80-rod spools in carload quantities.

WELDED PIPE AND TUBING

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

(F.o.b. Pittsburgh only on wrought pipe)

Base Price—\$200 per Net Ton

Steel (Butt Weld)

	Black	Galv.
½ in.	63½	51
¾ in.	66½	55
1 to 3 in.	68½	57½

Wrought Iron (Butt Weld)

	25	3½
½ in.	30	10
¾ in.	34	16
1 and 1½ in.	38	18½
2 in.	37½	18

Steel (Lap Weld)

	61	49½
2 in.	64	52½
2½ and 3 in.	66	54½

Wrought Iron (Lap Weld)

	30½	12
2 in.	31½	14½
2½ to 3½ in.	33½	18
4 in.	32½	17
4½ to 8 in.	32½	17

Steel (Butt, extra strong, plain ends)

	Black	Galv.
½ in.	61½	50½
¾ in.	65½	54½
1 to 3 in.	67	57

Wrought Iron (Same as Above)

	25	6
½ in.	31	12
¾ in.	38	19½
1 to 2 in.	38	19½

Steel (Lap, extra strong, plain ends)

	59	48½
2 in.	63	52½
2½ and 3 in.	66½	56

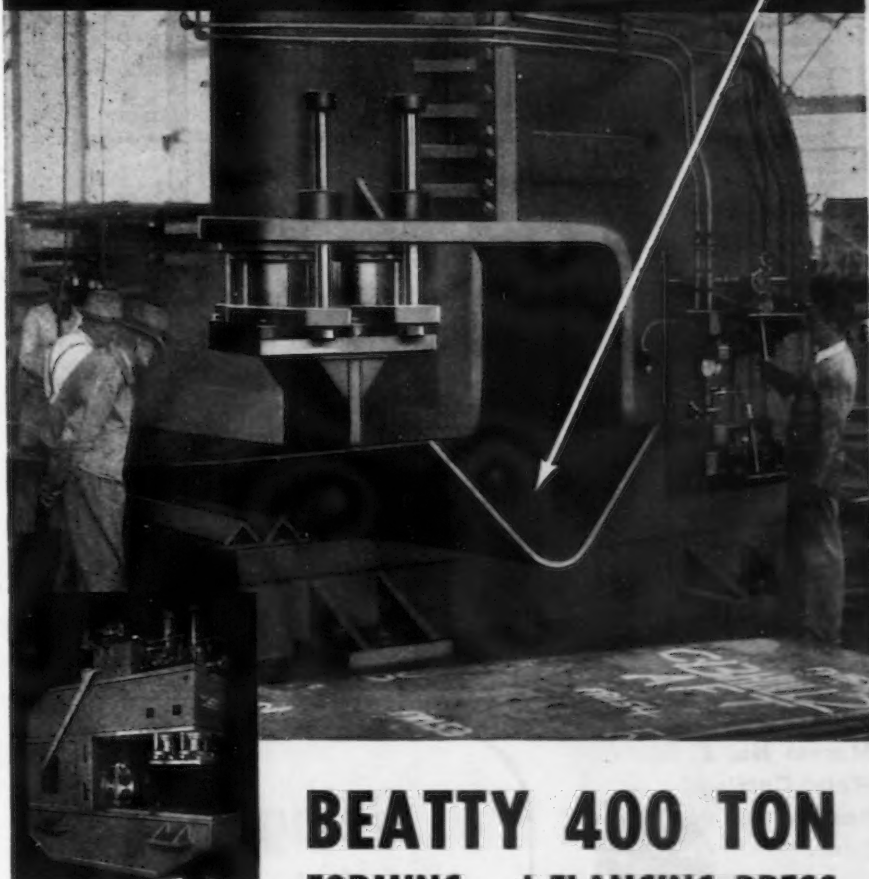
Wrought Iron (Same as Above)

	33½	15½
2 in.	39	22½
2½ to 4 in.	37½	21
4½ to 6 in.	37½	21

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card. F.o.b. Gary prices are two points lower discount or \$4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or \$2 a ton higher on all butt weld.

VICTORY

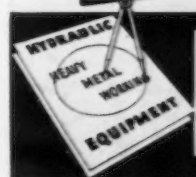
BEGAN WITH THIS -



BEATTY 400 TON FORMING and FLANGING PRESS

Widely used by shipbuilders, and other fabricators of heavy metal, the Beatty 400-Ton Hydraulic Forming & Flanging Press has the power, speed and adaptability to break production bottlenecks. Of very latest design, this unit, with its unique type pump and valve design, eliminates the need for cooling coils, with their inherent threat of water entering the oil supply line. If you work in heavy metal, there is a Beatty machine to help smooth out your production wrinkles. Inquiries answered promptly.

Beatty designs and builds heavy duty punches, shears, coping machines, forcing presses, extruding presses, hydraulic forming presses, bulldozers and related machines.



BEATTY MACHINE AND MFG. COMPANY

HAMMOND, INDIANA

PRICES

PIG IRON

All prices set in bold face type are maxima established by OPA on June 24, 1941. Other domestic prices (in italics) are delivered quotations per gross ton computed on the basis of the official maxima. Delivered prices do not reflect 3 per cent tax on freight rates.

	No. 2 Foundry	Basic	Bessemer	Malleable	Low Phosphorus	Charcoal
Boston††	\$25.50	\$25.00	\$26.50	\$25.50	.....	.....
Brooklyn	27.50	.....	.....	28.00	.....	.....
Jersey City	26.53	26.03	27.53	27.03	.....	.....
Philadelphia	25.84	25.34	26.84	26.34	\$30.74	.....
Bethlehem, Pa.	25.00	24.50	26.00	25.50	.....	.....
Everett, Mass.††	25.00	24.50	26.00	25.50	.....	.....
Swedeland, Pa.	25.00	24.50	26.00	25.50	.....	.....
Steelton, Pa.	.....	24.50	.....	.....	29.50	.....
Birdsboro, Pa.	25.00	24.50	26.00	25.50	29.50	.....
Sparrows Point, Md.	25.00	24.50	.....	.....	.....	.....
Erie, Pa.	24.00	23.50	25.00	24.50	.....	.....
Neville Island, Pa.	24.00	23.50	24.50	24.00	.....	.....
Sharpville, Pa.*	24.00	23.50	24.50	24.00	.....	.....
Buffalo	24.00	23.00	25.00	24.50	29.50	.....
Cincinnati, Ohio	23.94	23.94	.....	25.11	.....	.....
Canton, Ohio	25.39	24.89	25.89	25.39	32.69	.....
Mansfield, Ohio	25.94	25.44	26.44	25.94	32.86	.....
St. Louis	24.50	24.50	.....	.....	.....	.....
Chicago	24.00	23.50	24.50	24.00	35.46	\$31.34
Granite City, Ill.	24.00	23.50	24.50	24.00	.....	.....
Cleveland	24.00	23.50	24.50	24.00	32.42	.....
Hamilton, Ohio	24.00	23.50	.....	24.00	.....	.....
Toledo	24.00	23.50	24.50	24.00	.....	.....
Youngstown*	24.00	23.50	24.50	24.00	32.42	.....
Detroit	24.00	23.50	24.50	24.00	.....	.....
Lake Superior fc.	.....	.....	.....	.....	.....	\$34.00
Lyles, Tenn. fc.†	.....	.....	.....	.....	.....	33.00
St. Paul	26.76	.....	27.26	26.76	39.80	.....
Duluth	24.50	24.00	25.00	24.50	.....	.....
Birmingham	20.38	19.00	25.00	.....	.....	.....
Los Angeles	26.95	.....	.....	.....	.....	.....
San Francisco	26.95	.....	.....	.....	.....	.....
Seattle	26.95	.....	.....	.....	.....	.....
Provo, Utah	22.00	21.50	.....	.....	.....	.....
Montreal	27.50	27.50	.....	28.00	.....	.....
Toronto	25.50	25.50	.....	26.00	.....	.....

GRAY FORGE IRON: Valley or Pittsburgh furnace\$23.50

*Pittsburgh Coke & Iron Co. (Sharpsville, Pa., furnace only) and the Struthers Iron and Steel Co., Struthers, Ohio, may charge 50c. a ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable.

**Pittsburgh Ferromanganese Co. (Chester furnace only) may charge \$2.25 a ton over maximum basing point prices.

†Price shown is for low-phosphorous iron: high-phosphorous sells for \$28.50 at the furnace.

††Eastern Gas & Fuel Associates, Boston, is permitted to sell pig iron produced by its selling company, Mystic Iron Works, Everett, Mass., at \$2 per gross ton above maximum prices.

Delta Chemical & Iron Co., Chicago, may charge \$30 for charcoal iron at its Delta, Mich., furnace.

Basing point prices are subject to switching charges; silicon differentials (not to exceed 50c. a ton for each 0.25 per cent silicon content in excess of base grade which is 1.75 per cent to 2.25 per cent); phosphorous differentials, a reduction of 38c. per ton for phosphorous content of 0.70 per cent and over; manganese differentials, a charge not to exceed 50c. per ton for each 0.50 per cent manganese content in excess of 1.00 per cent. Effective March 3, 1943, \$2 per ton extra may be charged for 0.5 to 0.75 per cent nickel content and \$1 per ton extra for each additional 0.25 per cent nickel.

Metal Powders

Prices are based on current market prices of ingots plus a fixed figure. For ton lots f.o.b. shipping point, in cents per lb.

Copper, electrolytic, 150 and 200 mesh	21½ to 23¼c.
Copper, reduced, 150 and 200 mesh	20½ to 25¼c.
Iron, commercial, 100 and 200 mesh	13½ to 15c.
Iron, crushed, 200 mesh and finer.	4c.
Iron, hydrogen reduced, 300 mesh and finer	63c.
Iron, electrolytic, unannealed, coarser than 300 mesh	30 to 33c.
Iron, electrolytic, annealed minus 100 mesh	42c.
Iron, carbonyl, 300 mesh and finer	90c.
Aluminum, 100 and 200 mesh.	*23 to 27c.
Antimony, 100 mesh	20.6c.
Cadmium, 100 mesh	\$1
Chromium, 150 mesh	\$1.03
Lead, 100, 200 & 300 mesh, 11½ to 12½c.	51c.
Manganese, 150 mesh	51c.
Nickel, 150 mesh	51½c.
Solder powder, 100 mesh, 8½c. plus metal	58¼c.
Tin, 100 mesh	58¼c.

*Freight allowed east of Mississippi.

BOILER TUBES

Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes, Minimum Wall. Net base prices per 100 ft. f.o.b. Pittsburgh, in carload lots.

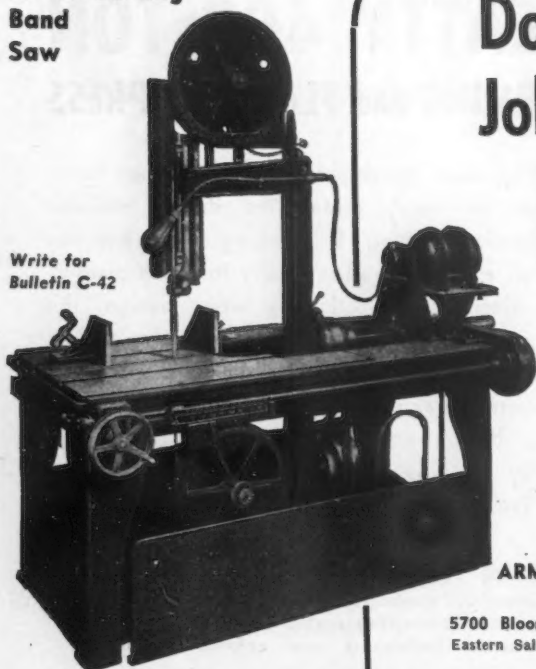
	Seamless	Lap Weld, Cold Hot	Drawn Rolled
1 in. o.d. 13 B.W.G.	15.03	13.04	12.33
2½ in. o.d. 12 B.W.G.	20.21	17.54	16.58
3 in. o.d. 12 B.W.G.	22.48	19.50	18.35
3½ in. o.d. 11 B.W.G.	28.37	24.62	23.16
4 in. o.d. 10 B.W.G.	35.20	30.54	28.66

(Extras for less carload quantities)

40,000 lb. or ft., and over	Base
30,000 lb. or ft. to 39,999 lb. or ft.	5%
20,000 lb. or ft. to 29,999 lb. or ft.	10%
10,000 lb. or ft. to 19,999 lb. or ft.	20%
5,000 lb. or ft. to 9,999 lb. or ft.	30%
2,000 lb. or ft. to 4,999 lb. or ft.	45%
Under 2,000 lb. or ft.	65%

Marvel No. 8 Metal-Cutting Band Saw

Write for Bulletin C-42



Doing its War Job Well!

The busiest tool in the tool rooms, an essential tool in the complete die shop and a time and money saver in the maintenance department, because "it does all things well." The MARVEL No. 8 Metal Cutting Band Saw (capacity 18" x 18") will snip off an 1½" drill rod, rough out the largest billet or cut a perfect 45° mortise on the end of a large I-beam without any special setting-up. Its large planer type bed takes all work. Its continuous blade feeds into the work at any angle from 45° right to 45° left. It has a large removable vise and a combination hand and/or power feed.

ARMSTRONG-BLUM MFG. CO.

"The Hack Saw People"

5700 Bloomingdale Ave., Chicago, U.S.A.
Eastern Sales Office: 225 Lafayette St., New York



PRICES

CAST IRON WATER PIPE

	Per Net Ton
6-in. and larger, del'd Chicago....	\$54.80
6-in. and larger, del'd New York....	52.20
6-in. and larger, Birmingham	46.00
6-in. and larger f.o.b. cars, San Francisco or Los Angeles	69.40
6-in. and larger f.o.b. cars, Seattle. 71.20	
Class "A" and gas pipe, \$3 extra; 4-in. pipe is \$3 a ton above 6-in. Prices shown are for lots of less than 200 tons. For 200 tons or over, 6-in. and larger is \$45 at Birmingham and \$53.80 delivered Chicago, \$59.40 at San Francisco and Los Angeles, and \$70.20 at Seattle. Delivered prices do not reflect new 3 per cent tax on freight rates.	

LAKE SUPERIOR ORES

(51.50% Fe, Natural Content, Delivered Lower Lake Ports*)

	Per Gross Ton
Old range, bessemer, 51.50	\$4.75
Old range, non-bessemer, 51.50	4.60
Mesaba, bessemer, 51.50	4.60
Mesaba, non-bessemer, 51.50	4.45
High phosphorus, 51.50	4.35

*Adjustments are made to indicate prices based on variance of Fe content of ores as analyzed on a dry basis by independent laboratories.

COKE

Furnace

	Per Net Ton
†Connellsville, prompt	\$6.50*

Foundry

†Connellsville, prompt	7.50
Fayette County, W. Va. (Beehive) ..	8.10
By-product, Chicago	12.25
By-product, New England	13.75
By-product, Newark 12.40 to	12.95
By-product, Philadelphia	12.38
By-product, Cleveland	12.30
By-product, Cincinnati	11.75
By-product, Birmingham	8.50†
By-product, St. Louis	12.02
By-product, Buffalo	12.50

Maximum by-product coke prices established by OPA became effective Oct. 1, 1941.

*Hand-drawn ovens using trucked coal are permitted to charge \$7.00 per net ton, plus usual transportation. Maximum beehive furnace coke prices established by OPA, Feb. 8, 1942. †F.o.b. oven.

FLUORSPAR

Maximum price f.o.b. consumer's plant, \$30 per short ton plus either (1) rail freight from producer to consumer, or (2) rail freight from Rosiclare, Ill., to consumer, whichever is lower.

Exception

When the WPB Steel Division certifies in writing the consumer's need for one of the higher grades of metallurgical fluor spar specified in the table below the price shall be taken from the table plus items (1 and 2) from paragraph above.

	Base price per short ton
Effective CaF ₂ Content: 70% or more	\$33.00
65% but less than 70%	32.00
60% but less than 65%	31.00
Less than 60%	30.00

REFRACTORIES

(F.o.b. Works)

Fire Clay Brick

	Per 1000
Super-duty brick, St. Louis	\$64.60
First quality, Pa., Md., Ky., Mo., Ill. 51.30	
First quality, New Jersey	56.00
Sec. quality, Pa., Md., Ky., Mo., Ill. 46.55	
Second quality, New Jersey	51.00
No. 1, Ohio	43.00
Ground fire clay, net ton	7.60

Silica Brick

Pennsylvania and Birmingham ...	\$51.30
Chicago District	58.90
Silica cement, net ton (Eastern) ..	9.00

Chrome Brick

	Per Net Ton
Standard, chemically bonded, Balt., Plymouth Meeting, Chester	\$54.00

Magnesite Brick

Standard, Balt. and Chester	\$76.00
Chemically bonded, Baltimore	65.00

Grain Magnesite

Domestic, f.o.b. Balt. and Chester in sacks (carloads)	\$44.00
Domestic, f.o.b. Chewelah, Wash. (in bulk)	22.00

RUTHMAN Gusher Coolant PUMPS

Here is the best protector you can get for your cutting tools. It's a Ruthman Gusher Coolant Pump which supplies immediately all the coolant your tools require. Whether they need a trickle or a gusher stream, they get it at once.

And from the long-pull viewpoint, these pumps contain improved features which assure efficient performance for years with no clogging or other troubles. Use Ruthman Pumps and your coolant will always be on tap.



No. 100 Decimal Timer

Graduated in decimal hundredths of a minute; sweep hand making complete revolution in one minute; total registration 30 minutes; "start-stop-and-fly-back" operation.



No. 105 Fifth Second Timer

Graduated in seconds and fifth seconds; sweep hand making complete revolution in one minute; total registration 30 minutes; "start-stop-and-fly-back" operation.

STOP WATCHES Available for Delivery

These instruments, produced in one of America's finest plants, contain a high precision, continuous running movement of seven jewels, encased in nickel.

We maintain a complete shop with skilled technicians for quick repairs on all types of stop watches, chronographs and other technical instruments.

M. J. STILLMAN CO., INC.

116 South Michigan Avenue

Chicago, Illinois

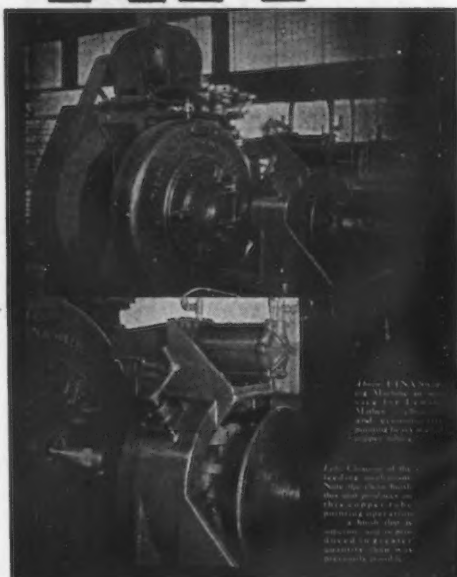
LEWIN-MATHES *Got the right answer at*

ETNA

They had a job of pointing heavy-walled copper tubing, and wanted to speed up the operation. Just how to do it didn't appear on the horizon, and so Lewin-Mathes did the safe and logical thing—they put their swaging job up to Etna.

The answer to that problem is illustrated on this page. It's a modern Etna Swaging Machine that points *more* copper tubes per hour in less time at less cost. If you have a problem involving tapering or reducing tubing and solid rounds—ask Etna about it.

Etna has the swaging machines from $\frac{3}{8}$ " to 4" and the experience to help you get the most out of this type of machine.



IF IT'S A QUESTION OF TAPERING, SIZING OR REDUCING OF ROUND SOLIDS OR TUBING...

Ask ETNA About Swaging

ETNA
MACHINE COMPANY
TOLEDO OHIO

PERFORATED METAL

INDUSTRIAL and

ORNAMENTAL

INDUSTRIAL PERFORATIONS include round, square and special shaped perforations as used in mechanical arts. Our line is comprehensive.

ORNAMENTAL PERFORATIONS as used in architectural grilles, metal furniture, enclosures, cabinets, stoves and for ornamentation. Many attractive and exclusive patterns.

H & K workmanship is unsurpassed.

**Any Metal
Any Perforation**

The **Harrington & King**
PERFORATING CO.

5657 FILLMORE STREET, CHICAGO 44, ILL. Eastern Office: 114 Liberty Street, New York 6, N. Y.

PRICES

Ferromanganese

78-82% manganese, maximum contract base price per gross ton, lump size, f.o.b. car at Baltimore, Philadelphia, New York, Birmingham, Rockdale, Rockwood, Tenn. Carload lots (bulk) \$135.00
Ton lots (packed) 141.00
Less ton lots (packed) 148.50
Premium, \$1.70 for each 1% above 82% Mn; penalty, \$1.70 for each 1% below 78%.

Electrolytic Manganese

99.9% manganese, maximum base contract price per lb. of metal, bulk, f.o.b. shipping point, with freight allowed to destination. Size, 1" x D.

	Eastern Zone	Central Zone	Western Zone
Carload lots	37.60c.	37.85c.	38.15c.
L.c.l. lots	39.60c.	38.60c.	40.65c.

Spiegeleisen

Maximum base contract prices, per gross ton, lump, f.o.b. Palmerton, Pa.
16-19% Mn 19-21% Mn 26-28% Mn
1% max. Si 1% max. Si 1% max. Si
Carloads \$35.00 \$36.00 \$49.50
Less ton* 47.50 48.50 62.00

Electric Ferrosilicon

OPA maximum base price cents per lb. contained Si, lump size in carlots, f.o.b. shipping point with freight allowed to destination.

	Eastern Zone	Central Zone	Western Zone
50% silicon	6.65c.	7.10c.	7.25c.
75% silicon	8.05c.	8.20c.	8.75c.

Spot sales 45c. per lb. higher for 50% Si; 30c. for 75% Si. For extras and premiums see MPR 405.

Silvery Iron

(Per Gross Ton, base 6.00 to 6.50 Si)
F.o.b. Jackson, Ohio \$29.50*
Buffalo 30.75*

For each additional 0.50% silicon add \$1 a ton. For each 0.50% manganese over 1% add 50c. a ton. Add \$1 a ton for 0.75% phosphorus or over.

*Official OPA price established June 24, 1941.

Bessemer Ferrosilicon

Prices are \$1 a ton above silvery iron quotations of comparable analysis.

Silicon Metal

OPA maximum base price per lb. of contained Si, lump size, f.o.b. shipping point with freight allowed to destination, for l.c.l. above 2000 lb., packed.

	Eastern Zone	Central Zone	Western Zone
96% Si, 2% Fe.	13.10c.	13.55c.	16.50c.
97% Si, 1% Fe.	13.45c.	13.90c.	16.80c.

Ferrosilicon Briquets

OPA maximum base price per lb. of briquet, bulk, f.o.b. shipping point with freight allowed to destination. Approximately 40% silicon.

	Eastern Zone	Central Zone	Western Zone
Car lots	3.35c.	3.50c.	3.65c.

Spot prices $\frac{1}{4}$ c. higher per lb. of briquet. For premiums and extras see MPR 405.

Silicomanganese

(Per gross ton, delivered, carloads, bulk)
3.00 carbon \$120.00*
2.50 carbon 125.00*
2.00 carbon 130.00*
1.00 carbon 140.00*

Briquets, contract, basis carlots, bulk freight allowed, per lb. ... 5.80c.†
Packed 6.05c.†
Less ton lots 6.68c.†

*Spot prices are \$5 per ton higher.
†Spot prices $\frac{1}{4}$ c. higher.

Ferrochrome

(65-72% Cr, 2% max. Si)
OPA maximum base contract prices per lb. of contained Cr, lump size in carlots, f.o.b. shipping point, freight allowed to destination.

	Eastern Zone	Central Zone	Western Zone
0.03% carbon	25.00c.	25.40c.	26.00c.
0.06% carbon	23.00c.	23.40c.	24.00c.
0.10% carbon	22.50c.	22.90c.	23.50c.
1.00% carbon	20.50c.	20.90c.	21.50c.
2.00% carbon	19.50c.	19.90c.	20.50c.

Spot prices are $\frac{1}{4}$ c. higher per lb. contained Cr. For extras and premiums see MPR 407.

PRICES

Other Ferroalloys

Ferrotungsten, delivered, carlots, per lb. contained tungsten	\$1.90
Tungsten metal powder, 98%-99%, any quantity, per lb.....	\$2.60
Ferrovanadium, 35%-40%, contract basis, f.o.b. producers plant, usual freight allowances, open-hearth grade, per lb. contained vanadium	\$2.70
Special grade	\$2.80
Very special grade	\$2.90
Vanadium pentoxide, 88%-92% V ₂ O ₅ technical grade, contract basis, any quantity, per lb. contained V ₂ O ₅	\$1.10
Ferrobaboron, contract basis, 17.50% boron minimum, f.o.b. Niagara Falls, carlots, per lb. alloy.....	\$1.20
Ton lots	\$1.25
Silcaz No. 3, contract basis, f.o.b. Niagara Falls, all quantities, per lb. of alloy	23c.
Silvaz No. 3, contract basis, f.o.b. Niagara Falls, all quantities, per lb. of alloy	40c.
Grainal, f.o.b. Bridgeville, Pa., freight allowed 100 lb. and over, maximum based on rate to St. Louis, per lb.	45c.
Bortam, f.o.b. Niagara Falls	
Ton lots, per lb.	45c.
Less ton lots, per lb.	50c.
Borosil, 3% to 4% boron, 40 to 45% silicon, f.o.b. Philo, Ohio, per lb. contained boron	\$7.00
Ferrocolumbium, 50% to 60%, f.o.b. Niagara Falls, ton lots, per lb. contained columbium ...	\$2.25
Less ton lots	\$2.30
Ferrotitanium, 40%-45%, f.o.b. Niagara Falls, N. Y., ton lots, per lb. contained titanium	\$1.23
Less ton lots	\$1.25
Ferrotitanium, 20%-25%, .010 C max., ton lots, per lb. contained titanium	\$1.35
Less ton lots	\$1.40
High-carbon ferrotitanium, 15%-20%, 6%-8% carbon, contract basis, f.o.b. Niagara Falls, N. Y., freight allowed East of Mississippi River, North of Baltimore and St. Louis, per gross ton....	\$142.50
3%-5% carbon	\$157.50
Ferrophosphorus, 18% electric or blast furnace, f.o.b. Anniston, Ala., carlots, with \$3 unitage freight equalized with Rockdale, Tenn., per gross ton	\$58.50
Ferrophosphorus, electrolytic 23-26%, carlots, f.o.b. Monsanto (Siglo), Tenn., \$3 unitage freight equalized with Nashville, per gross ton	\$75.00
Ferromolybdenum, 55-75 per cent, f.o.b. Langeloth and Washington, Pa., any quantity, per lb. contained molybdenum	95c.
Calcium molybdate, 40%-45%, contract basis, f.o.b. Langeloth and Washington, Pa., any quantity, per lb. contained molybdenum...	80c.
Molybdenum oxide briquettes, 48%-52% Mo, f.o.b. Langeloth, Pa., per lb. contained Mo.....	80c.
Molybdenum oxide, in cans, f.o.b. Langeloth and Washington, Pa., per lb. contained Mo.....	80c.
Molybdenum powder, 99%, in 200-lb. kegs, f.o.b. York, Pa., per lb. Under 100 lb.	\$2.60
.....	\$3.00
Zirconium, 35-40%, contract basis, carloads in bulk or package, per lb. of alloy	15c.
Less ton lots	16c.
Zirconium, 12-15%, contract basis, carlots, bulk, per gross ton....	\$102.50
Packed	\$107.50
Less ton lots	\$112.50
Alisifer (approx. 20% Al, 40% Si and 40% Fe), contract basis, f.o.b. Niagara Falls, per lb. ...	7.50c.
Ton lots	8c.
Simanal (approx. 20% Si, 20% Mn, 20% Al), contract basis, carlots, f.o.b. Phila., Ohio, per lb. ton lots	9.50c.
Less ton lots	10.50c.

New Open Hearth Furnaces
at 8 LARGE PLANTS

are Insulated with
Therm-O-Flake

SPECIFICATIONS
for Greater Fuel Economy
Improved Working Conditions

Therm-O-Flake Coating Vertical walls — bulkheads — roofs — arches.

Therm-O-Flake Brick Flue Walls and Arch — Checker Chamber Walls. Slag Pocket Walls.

Therm-O-Flake Concrete Flue — Checker Chamber Hearth Bottoms.



High Temperature

INSULATION



HEAT-TREATED STEEL SHOT

**We manufacture
shot and grit for
endurance**

A shot or grit that will blast fast with
a clean finish.

This is the only reason why so many
operators are daily changing to our
shot and grit, from Maine to Cali-
fornia.

The unprecedented demand for our—

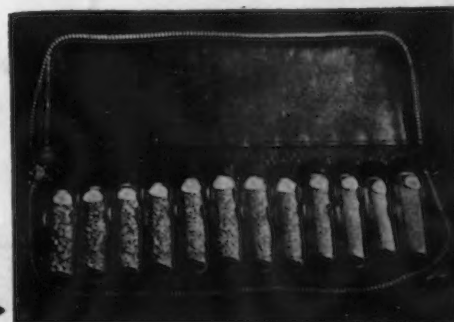
**Heat-Treated Steel Shot and
Heat-Treated Steel Grit**

has enabled us to expand our pro-
duction and maintain a quality
that is more than satisfactory to
our hundreds of customers all over
the country.

**HARRISON
ABRASIVE
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Manchester, New Hampshire

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SECONDARY ALUMINUM IS DOING A PRIMARY WAR JOB

Radial Aircraft Engine Parts
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Bearing Supports
Brake Housings
Brake Shoes
Cowl Rings
Drive Cases on Tanks
Transmission Cases on Tanks
Range Correction Board
Seacoast Computer

Oil Gear Unit Box, 40 mm
Gun
Pistons
Booster Pump Assemblies
Upper and Lower Gun
Turrets on Aircraft
Aircraft Lights and Fix-
tures
Gun Synchronizer Parts
Lamp Assemblies
Telescope Parts
Hand Tachometer for
Measuring Speed of
Propellers
Airborne Radio Gear
Housing Assembly
Electric Cable Connectors

*This partial list of wartime uses of secondary aluminum
may suggest its adaptability to your own product*



THE UGLY DUCKLING HAS BECOME A SWAN!

Let's eliminate the old idea about so-called "secondary" aluminum. Don't forget that the entire steel industry is based on the use of scrap... yet no one refers to steel as "primary" or "secondary." The same is true of ingot brass and bronze. The source

of raw materials need not be a reflection of the quality of the finished product—particularly when all industry is observing W.P.B.'s program of scrap segregation.

Today, thanks to that careful segregation (an advance that will not be lost when the war is over) and thanks to advances in technical knowledge and metallurgical processes, the secondary smelter is producing products of superb quality.

Consulting service on aluminum and other non-ferrous alloys available through your nearest Federated office.

FMD

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METALS DIVISION

AMERICAN SMELTING and REFINING COMPANY

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Nation-wide service with offices in principal cities